July 2021

Binder 174, Plagiorchiidae C-D [Trematoda Taxon Notebooks]

Harold W. Manter Laboratory of Parasitology

Calycodes Looss, 1901

Generic diagnosis. — Auridistomidae: Body much elongated, subcylindrical, spined anteriorly. Head with a dorsal and a ventral petaloid ridge continuous with each other laterally. From between these two ridges projects prominently the oral sucker with its aperture directed anteroventrally. Pharynx large. Esophagus short, lined with epithelia, with a pair of lateral diverticles anteriorly and a small posterior outgrowth at its bifurcation. Ceca wide, terminating at posterior extremity. Acetabulum of medium size, prominent, nearer to anterior extremity than to midbody. Testes tandem, in middle third of body. Cirrus pouch reaching backward beyond acetabulum, enclosing apparently bipartite seminal vesicle, well developed prostatic complex and ductus ejaculatorius. Genital pore wide, median, pre-acetabular. Ovary submedian, pretesticular. Vitellaria extending whole length of ceca, which they tend to overreach dorsally and ventrally. Uterus winding in intercecal field between anterior testis and acetabulum. Eggs of medium size. Excretory stem bifurcating behind posterior testis into long arms; lateral branches apparently lacking. Intestinal parasites of turtles.

Genotype: *C. anthos* (Braun, 1899) Looss, 1901 (Pl. 55, Fig. 665), in a chelonian; Japan.

Plagiorchiidae

Calycodes anthos (Braun, 1899) Looss, 1901

"After Braun"
From Pratt, 1902

CALYCODES

Genus Caudorchis Talbot, 1933

Body elliptical, spinous. Suckers approximately equal in size. Pharynx strongly muscular. Intestinal ceca narrow, extending laterally into posterior third of body. Genital pore close behind intestinal bifurcation. Testes small opposite or oblique, in posterior end of body. Vitellária composed of diffuse follicles situated laterially and ventrally to the intestinal ceca and e tending from the level of the genital pore to near the termination of the intestinal caeca. Uterus single loop extending to extreme posterior end of body, between testes, uncoiled. Eggs numerous, ovid, operculate and light brown.

Parasitic in lung of garter snake.

Type species: Caudorchis eurinus

Caudorchis eurinus Talbot, 1933

Body elliptical, dorso-ventrally flattened, anterior end rounded, tapering to blunt point posteriorly. Cuticular spines present, more numerous anteriorly. Body 1.94-3.27x0.58-0.78 in the region of the acetabulum. Oral sucker subterminal, circular, 0.29-0.38 in diameter. Acetabulum spherical 0.29-0.38 in diameter, in the center of body 0.70-1.24 from posterior margin of oral sucker. Prepharynx 0.046-0.077 long. Pharynx strongly muscular 0.15-0.18 wide. Pharyngeal glands present. Oesophagus short and slender, 0.15-0.23 long. Intestinal ceca narrow extending to the posterior testes. Anterior and posterior main collecting ducts of the excretory system full of dark excretory concretions. Testes oval, 0.15-0.26x0.12-0.18 situated near the posterior end of the body, arranged opposite or obliquely. Cirrus pouch cylindrical, 0.27-0.37 long, extending vertically across but never beyond centre of acetabulum. Ovary spherical, 0.10-0.14 in diameter situated to left of the median line just posterior to the acetabulum. Vitellaria composed of small scattered follicles, two groups anteriorly and two groups posteriorly; anterior groups extending to on a level with the genital pore, the posterior groups to within a short distance of the termination of the intestinal ceca. Uterus a descending and an ascending loop extending betweem the testes to the posterior end of the body and terminateing in a moderately developed metreterm. Metreterm extends along right side of the cirrus pouch and opens into the genital sinus on a level with the male aperature. Eggs oval, light brown, 42-46x18-23 μ .

Host: Thamnophis sauritus, T. sirtalis
Habitat: Lung
Locality: Cheboygan county, Michigan, U.S.A.
Type specimen: U.S.Nat. Mus. Hel. Coll. No. 9830

CAUDORCHIS

Cephalotrema Baer, 1943

Generic diagnosis. — Prosthogonimidae: Body small, oval to elliptical, spinose. Oral sucker very large, subequal to acetabulum. Esophagus very short, practically absent; ceca not reaching posterior extremity. Acetabulum large, in middle third of body. Testes symmetrical, postacetabular. Cirrus pouch long, curved, extending from dorsal side of acetabulum to genital pore, containing bipartite seminal vesicle and long pars prostatica. Genital pore by left side of oral sucker. Ovary round, submedian, pretesticular, usually in acetabular zone. Receptaculum seminis and Laurer's canal present. Vitellaria forming symmetrical lateral groups in bifurco-acetabular zone. Uterus convoluted in hindbody, overreaching ceca laterally; eggs small. Excretory vesicle V-shaped. Parasitic in intestine of mammals.

Genotype: *C. minutum* Baer, 1943 (Pl. 90, Fig. 1081), in *Neomys fodiens;* Switzerland.

CEPHALOTREMA

Cheloniotrema Caballero, Zerecero et Grocott, 1957

Generic diagnosis: Plagiorchiidae, Stomatrematinae. Body fusiform. Oral sucker subterminal, larger than acetabulum; pharynx strongly developed; esophagus short; ceca wide, terminating close to posterior extremity. Acetabulum just postbifurcal, smaller than oral sucker. Testes diagonal, largely postequatorial. Cirrus pouch rather small, situated obliquely over left portion of acetabulum, containing winding tubular seminal vesicle, prostatic complex and short unarmed cirrus. Genital pore ventral to beginning of left cecum to left of acetabulum. Ovary posterodorsolateral to acetabulum; seminal receptacle and Laurer's canal present. Uterine coils extending to posttesticular region as well as to lateral margin of middle third of body; eggs small, numerous. Vitellaria in lateral fields from behind oral sucker to level of posterior end of ovary. Excretory vesicle Y-shaped, divided into short arms in front of anterior testis. Parasitic in esophagus, duodenum, or ductus choledocus of freshwater chelonians.

Type species: *C. tropicum* Caballero, Zerecero et Grocott, 1957 (Fig. 997), in *Kinosternon integrum* and *K. panamense*; Mexico, Panama.. 2.822-2.922 X 1.112-1.195 (30 X 13-15).

Cheloniotrema tropicum Caballero, Zerecero, and Grocott,1956

4. Subfamily Stomatrematinae Yamaguti, 1958

Cheloniotrema tropicum Caballero, Zerecero, and Grocott, 1956

HOSTS IN PANAMA: *Kinosternon leucostomum* Duméril and Bibron, *K. panamensis* Schmidt, and *Chelydra acutirostris* Peters, (turtles).

HOST IN MEXICO: *Kinosternon integrum* Le Compte

LOCATION: Gall bladder and common bile duct

LOCALITIES: Achiote, Colon Province, Panama; also el Valle de Anton, Panama, and Tuxtepec, Oaxaca, Mexico.

GEOGRAPHIC RANGE: Mexico to Panama.

This species was described by Caballero, Zerecero, and Grocott, 1956, on the basis of five specimens from Panama and one from Mexico. Present material consists of 10 specimens from *Kinosternon leucostomum* and 3 from *Chelydra*

Thatcher, 1970

CHELONIOTREMA

Family **PROSTHOGONIMIDAE** Lühe

Genus COELOMOTREMA, ~~gen. nov.~~ ANGEL, 1970

Generic Diagnosis

Body plump, transparent, spinose. Suckers small; oral sucker almost terminal, smaller than acetabulum; acetabulum in anterior sixth of body. Oesophagus short, caeca wide, less than half length of body. Male and female ducts opening close together to left of oral sucker. Testes large, solid. Ovary entire, between acetabulum and testes. Excretory bladder very large, wide anteriorly, narrowing posteriorly. Parasitic in body cavity of dasyurids (Marsupialia).

* Yamaguti (1958) and Skrjabin (1961) attributed the family Prosthogonimidae to Nicoll (1924). However, Nicoll merely listed Prosthogonimidae and attributed it, rightly, to Lühe, who had named the subfamily Prosthogoniminae in 1909.

COELOMOTREMA ANTECHINOMIS, ~~sp. nov.~~ ANGEL, 1970

(Figs. 1–7)

Description of Species

Plump worms, not quite as thick as broad; greatest width at mid-body; anterior end pointed, posterior bluntly rounded; transparent when alive. Slender spines (about 20 by 3 μm) with slightly curved, pointed tip, set in cuticle on both dorsal and ventral surfaces; in surface view present scale-like appearance.

Mouth almost terminal; oral sucker very small; prepharynx very short; pharynx followed by short oesophagus; alimentary caeca wide, terminating ventrally to anterior margins of testes, lined by single row of columnar cells. Acetabulum small, but larger than oral sucker; compact, round, with spines similar to body spines around outer margin; in approximately anterior sixth of body.

TABLE I

MEASUREMENTS OF FLATTENED AND UNFLATTENED SPECIMENS OF *COELOMOTREMA ANTECHINOMES*

All measurements given in millimetres

Measurement	Specimens from *Antechinomys spenceri*				Specimen from *Antechinus flavipes leucogaster*‡
	Unflattened*	Unflattened†	Flattened	Flattened	
Length	7·65	7·21	11·2	10·3	10·37
Breadth	3·91	3·5	5·7	5·2	4·28
Thickness	2·89	2·52	—	—	—
Oral sucker	0·14 by 0·24	0·14 by 0·24	0·21 by 0·27	0·21 by 0·25	0·20 by 0·27
Pharynx	0·18 by 0·16	0·20 by 0·18	0·20 by 0·19	0·21 by 0·18	0·20 by 0·19
Acetabulum	0·34 by 0·37	0·36 by 0·39	0·44 by 0·44	0·44 by 0·46	0·44 by 0·41
D.A.E.§	0·92	0·95	1·33	1·53	1·19
Oesophagus	—	—	0·59	0·70	0·45
Caeca—max. width	0·21	0·24	0·41	0·39	0·44
Right testis	1·90 by 1·15	2·11 by 1·02 by 1·84	2·41 by 2·04	2·52 by 2·28	1·80 by 1·29
D.A.E.	2·96	2·89	4·35	4·30	3·88
Left testis	1·77 by 1·53	1·80 by 1·16	2·41 by 1·87	2·52 by 2·07	1·53 by 1·22
D.A.E.	3·23	3·13	4·66	4·00	4·05
Ovary	0·61 by 0·85	0·58 by 0·88	0·88 by 0·82	0·75 by 0·85	0·76 by 0·61
Vitellaria					
Right—extent	2·24	1·80	2·58	2·45	1·80
D.A.E.	0·88	1·09	1·70	1·87	1·53
Left —extent	1·97	1·80	2·01	2·21	1·80
D.A.E.	1·19	1·09	2·21	2·04	1·46
No. of bunches					
Right	9	9	—	—	—
Left	7	7	—	—	—

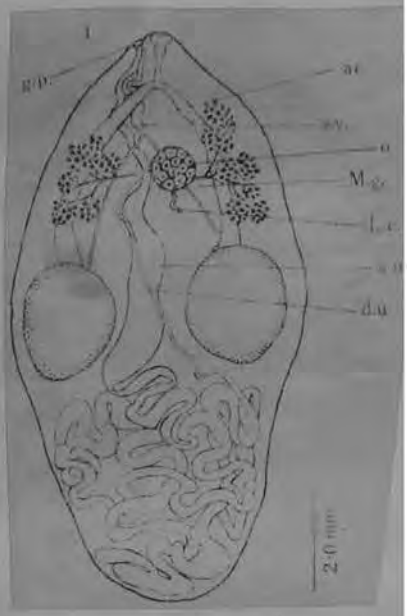
* This was sectioned subsequently. † Holotype. ‡ Partly flattened.

§ D.A.E., distance from anterior end.

Male and female ducts opening at genital pore near anterior tip of body, to left of oral sucker.

Testes solid, prominent, forming slight bulge on either side of mid-body, symmetrical, not quite contiguous. Vasa deferentia opening into vesicula seminalis to left of acetabulum and near its posterior border. Vesicula seminalis internal, first part about 1·1 mm long, wide, followed by narrower, coiled part which leads to long (0·6 mm), narrow cirrus. Prostatic cells surrounding proximal half of cirrus.

Ovary smooth, oval, immediately posterior to acetabulum, slightly to right. Oviduct very short. Mehlis' gland consisting of loosely packed gland cells; extending between 1·6 to 2·4 mm from anterior end of body, 1·2 mm across (measurements from sectioned specimen). Laurer's canal opening on dorsal surface just posterior to ovary; inwardly leading into a receptaculum seminis. Uterus descending approxi-



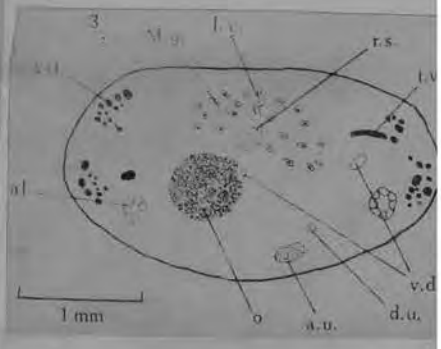


Fig. 1. Paratype E834: whole mount, dorsal view.
Fig. 2. Anterior end of paratype, ventral mount.
Fig. 3. Transverse section of paratype E835 through ovary.

-OVER

mately medially, only slightly sinuous ventrally to testes, but posteriorly to testes coiled, filling all of hind-body around bladder; ascending limb wider, passing forwards alongside descending limb, opening beside male duct at base of shallow genital atrium. Uterus strongly muscular from genital pore to level of ovary, gradually becoming less muscular posteriorly.

Eggs small (24 by 13 μm), yellow to brown, numerous.

Vitellaria confined to sides of body, in region between testes and anterior border of acetabulum, consisting of grape-like follicles arranged in bunches, seven bunches on left side and nine on right. (It was not possible to count the bunches in the two completely flattened specimens.) Transverse yolk ducts dorsal, near posterior border of ovary.

Excretory bladder (Figs. 4–7) large, prominent; extending from terminal pore to level of ovary; tube-like posteriorly, widening to a circular channel just posteriorly to testes, triangular in transverse section between testes, and anteriorly to testes occupying almost all of thickness of body and more than half width.

Discussion

Coelomotrema as now defined agrees with the characters given in Yamaguti's (1958) diagnosis for the family Prosthogonimidae, except that the worm is not small, the acetabulum lies in the anterior sixth rather than the anterior half of the body, and the shape of the excretory bladder is different. For Prosthogonimidae the excretory bladder was described as Y-shaped (though *Cephalotrema* has a V-shaped bladder); in *Coelomotrema* the bladder is more like an inverted cone.

Yamaguti (1958) listed four genera in the family Prosthogonimidae: *Prosthogonimus* Lühe, 1899, with 29 species; *Schistogonimus* Lühe, 1909, *Mediogonimus* Woodhead & Malewitz, 1936, and *Cephalotrema* Baer, 1943, each with one species. Skrjabin (1961, pp. 177–8) added *Ophthalmogonimus* Oshmarin, 1961; he gave a description and figure of *O. sudarikovi* Oshmarin, 1961, but cited no reference. In 1963 Oshmarin described *Ophthalmogonimus sudarikovi*, gen. et sp. nov.; I have been unable to consult this reference.

Cephalotrema and *Mediogonimus* occur in mammals, the other genera in birds.

Coelomotrema differs from the five genera in its location in the coelom of the host and morphologically in the more anterior position of the acetabulum and of the vitellaria. It differs also from the first four genera in the shortness of its alimentary caeca; the length of the caeca of *Ophthalmogonimus* was not mentioned by Skrjabin.

Coelomotrema resembles *Prosthogonimus*, *Ophthalmogonimus*, and *Cephalotrema* in the position of the male and female genital pores close together beside the oral sucker, though in *Cephalotrema*, because of the greater size of the oral sucker, they are not quite so anteriorly situated. However, in addition to the position of the acetabulum and of the vitellaria, and the length of the caeca, *Coelomotrema* also differs from *Prosthogonimus* in the shape of the ovary; from *Cephalotrema* in its much greater size, the very much smaller suckers and the form and extent of the seminal vesicle; and from *Ophthalmogonimus* in the very much smaller oral and ventral suckers and in the size of the ovary.

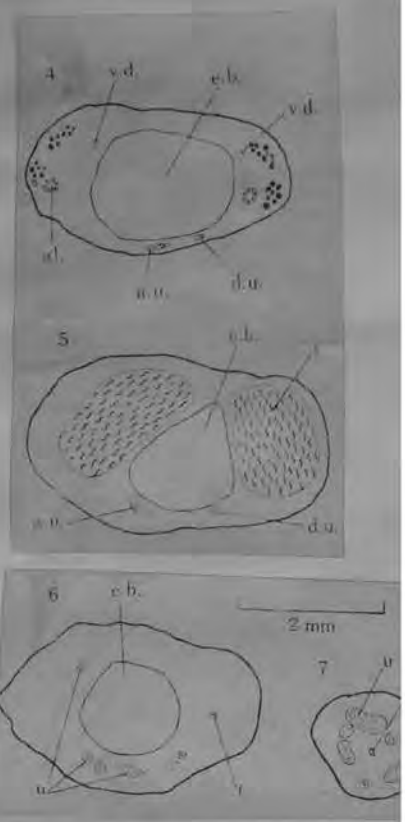
Coelomotrema is obviously different from *Mediogonimus* and *Schistogonimus* in the position of the genital pores. In *Mediogonimus* male and female ducts open medially, at the level of the pharynx. In *Schistogonimus* the male pore is anterior to the side of the oral sucker, and the female pore opens separately some distance away, at the anterolateral edge of the body.

The only representatives of the Prosthogonimidae recorded from Australia are *Prosthogonimus vitellatus* from *Chibia bracteata* (*Dicrura bracteata*) (Nicoll 1914*a*, pp. 345–6) and *Prosthogonimus* sp. from *Grallina picata* (Nicoll 1914*b*, p. 106).

So far the only trematodes recorded from dasyurids, *Brachylaemus dasyuri* (S. J. Johnston, 1913) and *Mehlisia acuminata* S. J. Johnston, 1913, are from the subfamily Dasyurinae. *Antechinomys* and *Antechinus* are placed in the Phascogalinae.

Coelomotrema antechinomes is the first species to be recorded in the Prosthogonimidae from the coelom of the host. However, *Prosthogonimus* spp. occur in the oviduct as well as the bursa Fabricii of the bird hosts. As both the marsupials in which *Coelomotrema antechinomes* was found were female, it seems obvious that the trematodes reached the body cavity of the hosts by way of the reproductive tract. The "calcified remains" of trematodes which were sent to me in spirit appeared to consist of undifferentiated tissue, but as Dr. Woolley is accustomed to making autopsies on marsupials, her diagnosis is probably correct. Presumably the "remains" were the result of old infections.

The only life histories recorded in the family are for various species of *Prosthogonimus*. The snail hosts are freshwater prosobranchs, *Amnicola* and *Bithynia* spp.; encystation occurs in dragonfly larvae.



Figs. 4–7.—Transverse sections of paratype E.835 illustrating shape and extent of excretory bladder. 4, 0·37 mm posterior to ovary; 5, through testes; 6, at posterior end of left testis; 7, 0·18 mm from posterior end. Figures 4–7 to same scale. *ac.*, acetabulum; *al.*, alimentary caecum; *a.u.*, ascending uterus; *e.*, eggs; *e.b.*, excretory bladder; *d.u.*, descending uterus; *L.c.*, Laurer's canal; *M.v.*, Mehlis' gland; *o.*, ovary; *p.c.*, prostatic cells; *r.s.*, receptaculum seminis; *s.v.*, seminal vesicle; *t.*, testis; *v.d.*, transverse vitelline duct; *ut.*, uterus; *vd.*, vas deferens.

COELOMOTREMA

CYLINDROTREMA Angel, 1973

Generic diagnosis

Prosthogonimidae. Medium sized, cylindrical worms, narrowed anteriorly, without spines. Suckers in form of deep cups. Acetabulum larger than oral sucker; situated in anterior third of body. Male and female ducts opening close together in small genital atrium to left of oral sucker. Testes symmetrical, midway between acetabulum and posterior end of body. Ovary median, anterior to testes. Vitellaria forming large bunches, dorsally and dorsolaterally, in hind body. Uterus much coiled, occupying most of hindbody posterior to testes.

Cylindrotrema differs from the other genera attributed to the family (with the possible exception of *Ophthalmogonimus*, for which the spination is not mentioned) in the absence of body spines*, from all except *Coelomotrema* Angel, 1970, and *Mawsonotrema* gen. nov, in its thick body, and from all except *Cephalotrema* and *Coelomotrema* and at least one species of *Prosthogonimus* (see discussion on *P. vitellatus*) in the presence of a small genital atrium. It is closest to *Prosthogonimus* Lühe, differing from it in the cylindrical body, the absence of body spines, in the ovary being median rather than submedian, and in its location in the host (bursa Fabricii, cloaca or oviduct in *Prosthogonimus*, caecum in *Cylindrotrema*).

Coelomotrema antechinomes, the only species of the genus, occurs in the coelom of dasyurids (Marsupialia), whereas *Cylindrotrema cygni* was found in the caecum of the black swan. *Cylindrotrema cygni* differs morphologically from *Coelomotrema antechinomes* in the lack of body spines, in the much greater size of its suckers, the more posterior position of its acetabulum, the more posterior location of the vitellaria, the greater length of the caeca, and the lobulate ovary. It resembles *Coelomotrema antechinomes* in its plump body, and in having seven vitelline bunches on the left side, and nine on the right.

The only prosthogonimid to have been recorded from swans is *Prosthogonimus cuneatus* (Rudolphi, 1809), which has been recorded from several species of *Cygnus*, as well as from other birds. In addition to the generic differences, *Cylindrotrema cygni* differs from *P. cuneatus* in several other characters.

* Dollfus (1948, p. 13) stated that body spination could not be used to separate the species of *Prosthogonimus*, as the spines were almost always damaged. However, the specimen of *Cylindrotrema cygni* was in good condition, and there was no indication of spines on the surface.

ANGEL, 1973

Cylindrotrema cygni ~~gen. nov., sp. nov.~~.

Host. *Cygnus atratus* [(Latham, 1790)] (black swan).
Locality. Tailem Bend, River Murray, South Australia, 20. viii. 1951.
Location in host. Caecum.
Incidence. One specimen found in one of 19 *Cygnus atratus* (from South Australia) dissected in this department.
Holotype. SAM, E995 (in spirit).

The single specimen on which this description is based had been stored in 70% alcohol with 5% glycerine. Preliminary observations were made, and the specimen was then stained in Van Cleave's combination haemotoxylin stain and destained with acid alcohol. It was then possible to see most structures quite clearly. However, from the acetabular region forwards the body was rather dark, and the reproductive ducts and their terminations were not clear. The specimen was cleared in cedarwood oil, in which it contracted slightly. Its length was 8 mm in spirit and 7·2 mm in cedarwood oil. Although the description is based on the unstained and stained specimen before as well as after clearing, all measurements were made from the specimen after clearing in cedarwood oil.

Description

Length 7·2 mm, diameter 2·1 mm. Body elongate, cylindrical; with rounded posterior end; anterior end narrowing from forwardly directed acetabulum. Body surface without spines. Both suckers forming deep cups. Oral sucker 0·49 long, 0·51 wide, 0·47 deep. Acetabulum in anterior two-sevenths of body, 1·15 by 1·16 by 0·82. Ratio of widths, of oral sucker to acetabulum 1 : 2·27.

Mouth ventro-terminal. Prepharynx very short; pharynx 0·26 by 0·25 by 0·28; oesophagus short (0·30); bifurcation of caeca immediately anterior to acetabulum; caeca (0·12 wide) ending 1·2 from posterior end of body.

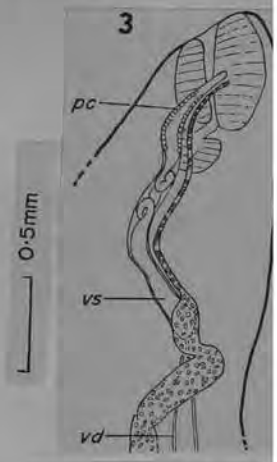
Testes oval, symmetrical, not quite contiguous, situated almost midway between acetabulum and posterior end of body, and midway between dorsal and ventral surfaces. Left testis 0·78 by 0·54 by 0·58; right testis 0·78 by 0·53 by 0·51. Vasa deferentia uniting dorsally near posterior border of acetabulum. Vesicula seminalis, apparently internal, 0·10 wide, lying dorsal to acetabulum; coiling two or three times anterior to acetabulum, then opening into what appears to be pars prostatica surrounded with small cells, followed by short cirrus, 0·088 wide. Terminal part of male duct passing to left of pharynx, then bending outwards, and opening into small genital atrium to left of oral sucker.

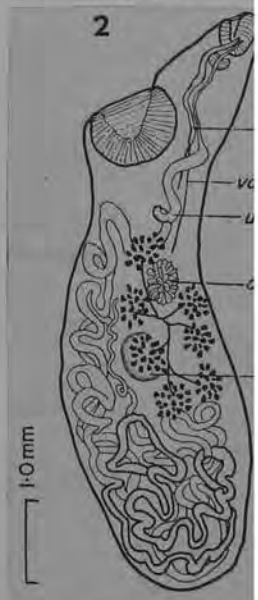
Ovary 0·73 by 0·65 by 0·41, median, anterior to testes, close to dorsal surface; rounded, composed of lobes radiating outwards; lobes narrow at base, with wider terminal portion 0·18 by 0·08. Mehlis' gland, Laurer's canal and receptaculum seminis not seen.

Vitellaria in hind body, extending anteriorly to within 0·68 of acetabulum, and posteriorly to 1·70 from hind end of body; lying dorsally and dorso-laterally just below surface; consisting of distinct bunches (seven on left, nine on right), each approx. 0·75 by 0·58, composed of some 40 follicles, up to 0·17 long and 0·08 wide. Transverse vitelline ducts opening into small vitelline reservoir lying dorsal to ovary.

Descending uterus passing ventral to testes; coiling greatly, reaching close to dorsal surface posterior to vitellaria, and extending to hind end of body. Ascending uterus close to ventral surface, overlapping caecal field posteriorly, mostly intercaecal anteriorly; passing dorsally anterior to ovary and then anteriorly dorsal to mid-acetabulum; running alongside male duct to open very close to male pore in genital atrium.

Eggs numerous, yellow to brown, up to 0·023 by 0·014.





CYLINDROTREMA

Dasymetra Nicoll, 1911

Generic diagnosis. — Plagiorchiidae, Styphlodorinae: Body flattened elliptical or more elongated, spinulate. Acetabulum nearly as large as oral sucker, pre-equatorial or equatorial. Oral sucker and pharynx large. Esophagus short, ceca terminating near posterior extremity. Testes diagonal, postequatorial. Cirrus pouch overlapping acetabulum, may reach beyond it. Genital pore median, at or behind intestinal bifurcation. Ovary posterodextral to acetabulum. No receptaculum seminis. Laurer's canal present. Vitellaria extending along ceca for their greater part. Uterus inter- and postcecal, reaching to posterior extremity; metraterm

very muscular. Excretory arm giving off collecting vessels on its outer sides. Gastrointestinal parasites of water snakes.

Genotype: *D. conferta* Nicoll, 1911 (Pl. 46, Fig. 679), in *Tropidonotus rhombifer*, also in mouth of *Natrix sipedon;* North America.

Physa integra determined experimentally as intermediate host, and cercaria described — McCoy (1928).

Other species:

D. longicirrus (Odlaug, 1938), syn. *Zeugorchis longicirrus* Odlaug, 1938, in *Natrix sipedon;* Louisiana. Also in *N. cyclopion floridana, N. fasciata pictiventris, Thamnophis sirtalis;* Florida.

D. *nicolli* Holl et Allison, 1925, in *Natrix sipedon;* Pennsylvania. Also in *N. rhombifera;* Tennessee.

D. provitellaria Bennett, 1938, in *Farancia abacura;* Louisiana.

D. villicaeca Byrd, 1935, in *Natrix sipedon, N. rhombifera* and *N. cyclopion;* Louisiana. Xiphidiocercaria with flame cell formula $3\times6\times2$ develops in *Physa helei*, encysts in tadpoles of *Rana catesbiana, R. clamitans* and *Hyla cinerea*, and *Pseudacris occidentalis*. Adults were obtained by feeding infected tadpoles to *Natrix sipedon fasciata, N. s. erythrogaster, N. rhombifera* and *N. cyclopion* — Byrd (1935). Experimental studies — Walker (1937, 39).

Trans. Amer. Micros Soc., 54: 226-228 1935

A NEW TREMATODE *DASYMETRA NICOLLI* FROM A SNAKE

FRED J. HOLL AND LEONARD N. ALLISON
University of Buffalo

During the examination of snakes collected near Grove City, Pennsylvania, an apparently new species of trematode was found in the stomach of the water-snake *Natrix sipedon* Linn. This trematode is placed in the Family Plagiorchidae Luhe 1901, the subfamily Reniferinae Pratt 1903 and the genus *Dasymetra* established by Nicoll (1911) for the worm *D. conferta* from the Diamond Water-snake *Tropidonotus rhombifer* (Hallowell) from North America.

Dasymetra nicolli n. sp.

The collection consisted of six worms which ranged in length from 2.97 to 4.15 mm. and the breadth at about the middle, which is the widest region, from 1.25 to 1.48 mm. A comparison of the specimens showed the length to be from 2.0 to 2.8 times the breadth. The type species measured 4.07 by 1.48 mm.

In these worms only a few spines were found in the cuticle. The oral sucker is subterminal in position being 0.5 mm. in diameter. The acetabulum is in the anterior area of the middle third of the body and nearly the same size as the oral sucker.

A very short prepharynx follows the mouth. The pharynx is strongly muscular, 0.23 mm. long by 0.32 mm. wide. The esophagus is short, 0.1 mm. long, with periesophageal gland cells. The intestinal crura are moderately wide and extend into the posterior region of the body.

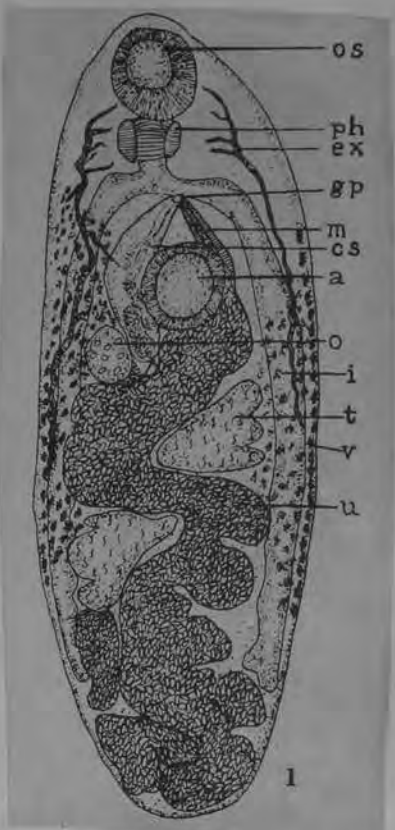
The ovary, 0.25 by 0.26 mm., is dorsal to the right margin of the acetabulum and near the dorsal surface. The oviduct is short and extends from the dorsal surface of the ovary to the large Mehlis' gland. Laurer's canal was not located. The uterus is large and extends from Mehlis' gland, coiling slightly to near the posterior end of the body, where it turns, passes between the testes and extends to a metraterm which is moderately muscular. The genital pore is median in position, being between the bifurcation and the acetabulum. The vitellaria extend from the level of the genital pore to the posterior limits of the intestine. They lie lateral and median to the intestinal branches.

The testes are lobate and are situated obliquely. The left testis, 0.54 mm. by 0.6 mm., is anterior in position. The right testis is 0.47 mm. by 0.57 mm. In all specimens the right testis was smaller in size. A cirrus pouch which extends from the posterior region of the acetabulum is present.

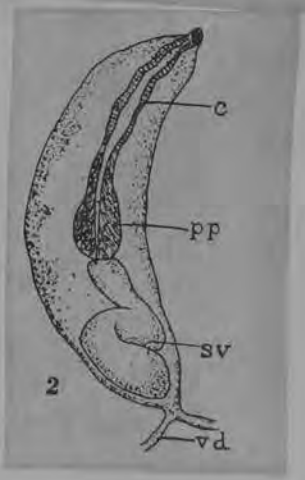
The excretory system is Y-shaped, and the lateral branches and tubes can be clearly seen because of the dark pigment in the tubules.

Dasymetra nicolli differs from *D. conferta* in having lobate testes. The general shape, also, differs. Nicoll states that the length of *D. conferta* is three and one-half times the breadth. In *D. nicolli* the average length is about two and one-half times the breadth.

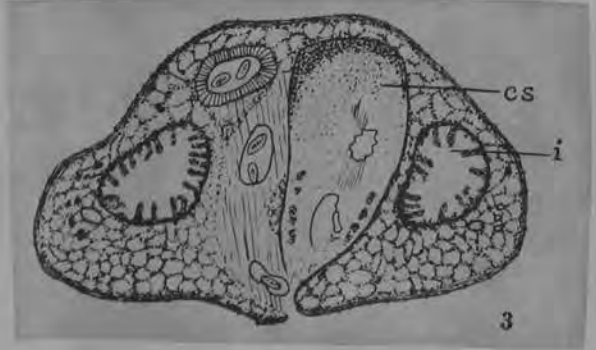
Type species in the Helminthological Collection, U. S. Museum.



1



2



3

Dasymetra villicaeca Byrd, 1935

***Dasymetra villicaeca* Byrd, 1935**

Observations were based on 96 specimens from the mouth, esophagus and/or small intestine of 33 snakes representing eight host species. *C. constrictor flaviventris*, *N. fasciata confluens*, *N. fasciata fasciata*, *N. fasciata pleuralis* and *T. sauritus* are new hosts for this parasite, other hosts are listed in Table 1.

FROM RABALAIS, 1969

DASYMETRA

LOOSE LEAF
ORGANIZER

SCHEDULE

OD TIME								
URSE ON. STRUCTOR								
URSE JE. STRUCTOR								
URSE ED. STRUCTOR								
URSE HU. STRUCTOR								
URSE RI. STRUCTOR								
URSE AT. STRUCTOR								

NAME _____

ADDRESS _____

SCHOOL _____ TELEPHONE _____

Dolichopera Nicoll, 1914

Generic diagnosis. — Plagiorchiidae, Dolichoperoidinae: Body small, approximately fusiform, spinulate. Acetabulum smaller than oral sucker, postequatorial. Oral sucker large, esophagus short, ceca terminating at posterior extremity. Testes almost symmetrical, just behind acetabulum. Cirrus pouch relatively small, extending obliquely in neck region, containing bipartite seminal vesicle, a small bulbous pars prostatica and a short ejaculatory duct. Genital pore near lateral margin of neck. Ovary posterodorsolateral to acetabulum. Uterus convoluted, in intercecal field between acetabulum and intestinal bifurcation, and not extending back of testes. Vitellaria limited to lateral fields in acetabulotesticular zone. Excretory vesicle? Intestinal parasites of snakes.

Genotype: *D. parvula* Nicoll, 1914 (Pl. 49, Fig. 600), in *Python variegatus;* N. Queensland.

DOLICHOPERA Nicoll,1914

Small to moderate size, elongated and somewhat flat. Cuticle covered with spines. Ventral sucker smaller than oral sucker and situated behind the middle of the body. Esophagus short and ceca extending to near posterior end of body. Genital pre between oral sucker and margin of body, on right or left side. Cirrus sac sinuous and elongated. Ovary behind the right posterior quadrant of acetabulum. Testes behind ovary near the posterior end of body, longitudinally oval and somewhat asymmetrical, the left testis in advance. Vitellaria entirely lateral in posterior part of body. Uterus very voluminous, filling entire middle of body, and passing between testes only for a very short distance. Eggs 30 to 40 by 20 μ. Intestine and lungs (?) of snakes.

Type species: D. parvula Nicoll,1914

Dolichopera parvula Nicoll,1914

Length: 2.4
Width: ## 0.7
Cuticula with spines disappearing behind ventral sucker.
Oral sucker: 0.41
Ventral sucker: 0.34, 1.51 from anterior end
Esophagus about as long as pharynx
Cirrus sac slender and slightly curved, reaching obliquely from genital pore to intestinal bifurcation.
Ovary oval, partly dorsal to ventral sucker
Testes almost symmetrical, 0.1 behind ventral sucker.
Vitellaria scanty, a few follicles,extracecal, from middle of ventral sucker to middle of testes.

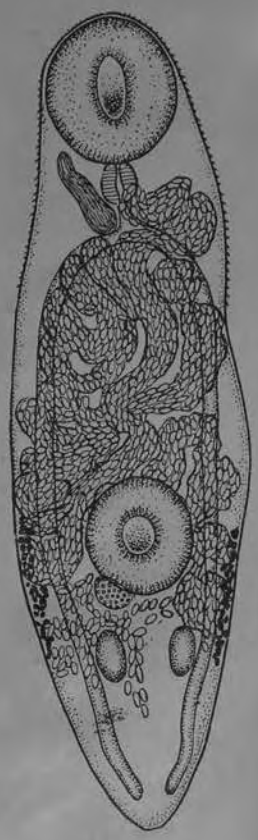
Host: Python variegatus , carpet snake
Locality: Australia

Compared with a species described by MacAlpine (1891) from the tiger snake (Hoplocephalus superbus) which Nicoll (1914) names: Dolichopera macalpini

Reference: Parasitology, 4:333-350

Dolichopera parvula Nicoll, 1914

Host: Python variegatus



179

DOLICHOPERA

Dolichoperoidinae Johnston et Angel, 1940

Subfamily diagnosis. — Plagiorchiidae: Body fusiform to elongate elliptical, spinose. Oral sucker comparatively large. Esophagus very short. Ceca terminating at posterior extremity. Acetabulum subequal to oral sucker, nearer to acetabulum than to posterior extremity or vice versa. Cirrus small or large. Seminal vesicle bipartite or simple. Genital pore near lateral margin of neck. Ovary median or submedian, immediately postacetabular. Receptaculum seminis present. Vitellaria extending in lateral fields of hindbody or limited to acetabulo-testicular zone. Uterus strongly coiled mainly in fore- or hindbody, not reaching posterior extremity. Excretory vesicle Y-shaped. Parasites of snakes.

Key to genera of Dolichoperoidinae

Cirrus pouch small, vitellaria in acetabulo-testicular zone; uterine coils mainly in forebody ..... *Dolichopera*

Cirrus pouch extremely large; vitellaria extending from level of acetabulum to cecal ends; uterine coils mainly in hindbody ..... *Dolichoperoides*

Dolichoperoides Johnston et Angel, 1940

Generic diagnosis. — Plagiorchiidae, Dolichoperoidinae: Body small, elongate, elliptical, with a short caudal projection, spinose. Acetabulum slightly postequatorial, usually very slightly smaller than oral sucker. Oral sucker subterminal, with ventral opening; prepharynx present. Esophagus short, ceca terminating at posterior extremity. Testes side by side near posterior extremity with stem of excretory vesicle between. Cirrus pouch large, curved, extending between two suckers, containing simple seminal vesicle, prostate complex and unarmed cirrus. Genital pore posterosinistral to oral sucker. Ovary immediately behind acetabulum. Receptaculum seminis nearly as large as ovary. Laurer's canal opening dorsally between two testes. Uterus extensively coiled between testes and acetabulum; eggs small, extremely numerous, dark brown in mass. Vitellaria limited to lateral fields from level of anterior end of acetabulum to cecal ends. Excretory vesicle Y-shaped, bifurcating just behind shell gland; pore at tip of caudal appendage. Intestinal parasites of snakes.

Genotype: *D. macalpini* (Nicoll, 1914) (Pl. 54, Fig. 656), syn. *Dolichapera m.* N., in *Notechis scutatus, Denisous superba;* Australia.

Xiphidiocercaria (*Cercaria nigrocystica* Bradley, 1926) develops in *Ameria pyramidata* and *A. pectorosa*, encysts in tadpoles (*Lymnodynastes tasmaniensis, L. dorsalis* and *Hyla aurea raniformis*) — Johnston and Angel (1940).

Dolichoperoidinae Johnston & Angel,1940

Reniferidae: cuticle spiny; acetabulum in posterior half of body, smaller than anterior sucker; esophagus short; ceca extending almost to end of body; genital pore nearly marginal near oral sucker, on one or other side of body; cirrus sac elongate, sinuous; testes nearly symmetrical, lying in posterior part of body; ovary on one side just behind acetabulum; receptaculum eminis and Laurer's canal present; uterus extensive, occupying most of the region between the testes and the oral sucker, not extending between the testes into the posterior end of the body, but may underlie the testes; metraterm feebly developed; vitellaria numerous, follicular, mainly extracecal, in posterior half of body; larval stage a xiphidiocercaria with long ceca and a Y-shaped excretory bladder whose arms do not surround the acetabulum. Adult in lung, trachea and esophagus of snakes; metacercaria in frogs. Genera:
Dolichoperoides and Dolichopera

DOLICHOPEROIDES

Acetabulum near midbody; testes near posterior end of body; cirrus sac very large; uterus with very numerous coils between the testes and acetabulum, as well as in front of the latter. Type: D.macalpini (Nicoll,1914) Johnston & Angel,1940

DOLICHOPERA Nicoll, emed. Johnston & Angel,1940

Acetabulum well behind midbody; testes just behind midbody; cirrus sac relatively small; uterus with coils mainly preacetabular.

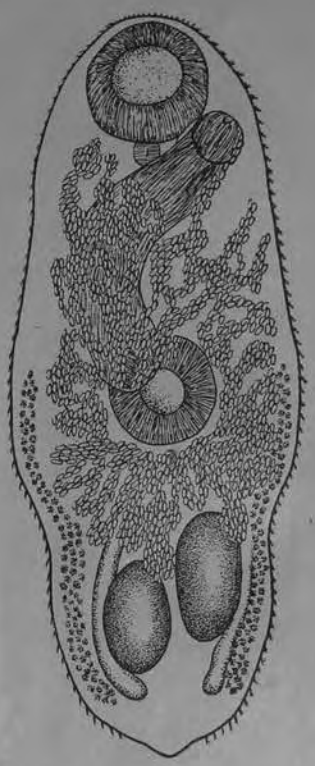
Type: D.parvula Nicoll

Dolichoperoides macalpini (Nicoll, 1914) Johnston et Angel, 1940

(Рис. 180)

Синоним: *Dolichopera macalpini* Nicoll, 1914

Хозяин: змея — *Denisonia superba*.
Локализация: легкие, трахея, пищевод.
Место обнаружения: Австралия.
Описание вида (по Николлю, 1918). Тело довольно плоское, удлиненно-



180

DOLICHOPERDIDES

Dolichosaccus Johnston, 1912
Syn. *Brachysaccus* Johnston, 1912
Lecithopyge Perkins, 1928

Generic diagnosis. — Plagiorchiidae, Omphalometrinae: Body elongate, flattened, spinulate. Acetabulum small, one-third of body length or more from anterior extremity. Oral sucker and pharynx well developed. Esophagus short. Ceca terminating at or near posterior extremity. Testes tandem or diagonal, in posterior half of body. Cirrus pouch large, elonggate, may or may not extend further backward than acetabulum, enclosing bipartite seminal vesicle. Genital pore between acetabulum and intestinal bifurcation. Ovary submedian, rarely median, postacetabular, some distance in front of testes in middle third of body. Receptaculum seminis comparatively large. Vitellaria occupying almost entire lateral fields, leaving head and neck region free or not. Uterus winding between testes and genital pore, overreaching ceca laterally or not. Excretory vesicle Y-shaped, with long stem and short arms. Parasitic in digestive tract of amphibians.

Genotype: *D. trypherus* Johnston, 1912 (Pl. 41, Fig. 510), in *Limnodynastes peronii* and *Hyla aurea;* Australia.

Other species:

D. amplicavus Travassos, 1924, in *Eloisa nasus;* Brazil.

D. anartius (Johnston, 1912) (Pl. 41, Fig. 502), syn. *Brachysaccus anartius* Johnston, in intestine and rectum of *Hyla aurea* and *Limnodynastes peronii;* Australia.

D. diamesus Johnston, 1912, in *Hyla freycineti;* Australia.

D. ischyrus Johnston, 1912, in *Limnodynastes dorsalis* and *Hyla coerulea;* Australia.

D. juvenilis (Nicoll, 1918), syn. *Brachysaccus juvenilis* Nicoll, *Opisthioglyphe juvenilis* (Nicoll) Travassos, 1930, in *Chiroleptes brevipalmatus;* Australia.

D. rastellus (Olsson, 1875) Travassos, 1930, syn. *Opisthioglyphe rastellus* (Olss.), syn. of *Opisthioglyphe hystrix* Molin, 1861— Issaitchikow, 1933, in *Rana temporaria* and *Bufo vulgaris;* Europe. *Limnaea auricularis, L. stagnalis; Alytes obstetricans, Salamandra maculosa, Triton palmatus* — Joyeux and Baer (1927).

D. rastellus cylindriformis (Perkins, 1928) in *Rana temporaria;* locality unknown (France or Hertfordshire?).

D. rastellus subulatus (Perkins, 1928) in *Rana temporaria;* Cambridgeshire and Hertfordshire. Also in *Bufo vulgaris;* Hertfordshire.

D. symmetrus (Johnston, 1912), syn. *Brachysaccus symmetrus* Johnston, *Opisthioglyphe symmetrus* (Johnston), in *Hyla coerulea;* Australia.

Dolichosaccus Johnston,1912

Generic diagnosis after Johnston:

Small,elongated worms of somewhat flattened oval cross-section, about 3 mm. long, a little narrowed in front and behind, and rounded off at both ends. Integument spiny; suckers well developed, not far apart. prepharynx,pharynx and esophagus present; intestinal limbs reaching to the posterior end of the body. Excretory vesicle Y-like, with a very long stem and short arms. Genital opening near middle line, just behind fork of intestine, and in front of ventral sucker. Large,rounded testes in posterior half of the body, one behind the other in the middle line; large rounded ovary, some distance in front of testes. Copulatory organs present; S-shaped cirrus sac very long, and well developed; vesicula seminalis constricted in the middle; Laurer's canal strongly developed,very long and convoluted; receptaculum seminalis doubtful. Vitelline glands extensively developed,laterally placed in the anterior half of the body,close under surface. Uterus comparatively short,except for a very short part of the proximal portion,lying in front of the ovary.

In the intestine of frogs.

Type species: D.trypherus Johnston,1912

Plagiorchidae

Dolichosaccus trypherus Johnston,1912

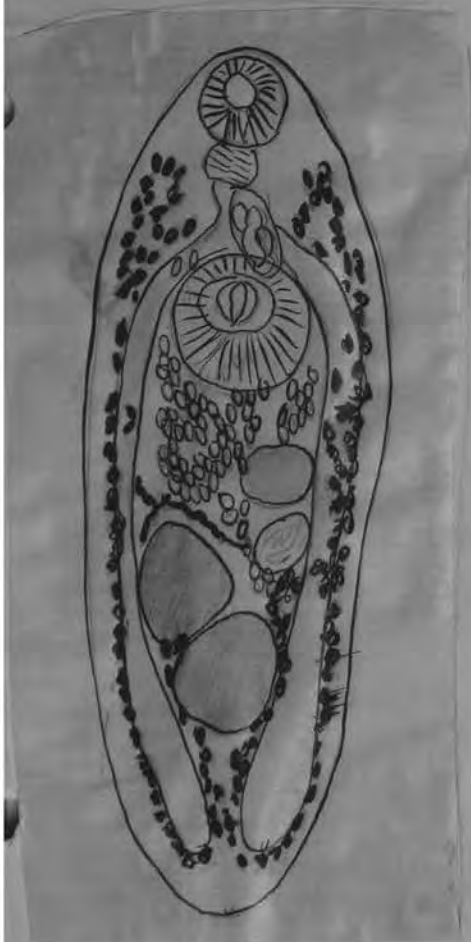
Small elongated, delicate worms about 3 mm long becoming gradually narrower towards the ends and rounded off in front and behind. Integument delicate, spiny; suckers not far apart; oral sucker larger than ventral, ratio 7:5. Genital pore just behind the intestinal fork. Testes larger than ovary, one close behind the other, in the middle of posterior half of body. Ovary some distance behind the ventral sucker, to one side of the middle line. Vitelline glands of comparatively small follicles, in front of the ovary not extending inwards beyond the intestinal limbs and anteriorly not reaching in front of intestinal fork; behind the ovary gradually spreading under the whole surface of the body. Uterine loops mainly in front of ovary. Eggs light in color, 37 by 22 µ.
Hosts: Limnodynastes peronii and Hyla aurea in the duodenum

Location: Australia

Dolichosaccus amplicava Trav., 1924:622

Length 2.25 mm., width 0.9 mm.
Body flat, delicate, and without visible spines, sub-ellipsoidal, widest diameter pre-equatorial or equitorial.
Oral suckersubterminal, strong, 0.25 mm. in diameter.
Acetabulum very strong, about twice the diameter of the oral, globular with small aperture sometimes lozenge shaped, 0.45 mm. in diameter, pre-equatorial.
No prepharynx, pharynx strong about 0.17 mm. in diameter, esophagus about twice this in length; ceca long and wide, extending to posterior end.
Genital pore median, pre-bifurcal. Cirrus sac long and with convoluted sem. ves., about 0.30 by 0.10 mm.
Testes post-equatorial, large, rounded, about 0.3 mm. in diam. with fields and zones partially overlapping. Sem. rec. very large, below the ovary. L. canal not seen.
Uterus pre-testicular and testicular with few eggs.
Eggs large 60 by 40 u. Vitellaria of large follicles, extra-and intra-cecal. Anteriorly to the zone of the pharynx in cecal and extra-cecal areas, posterior to the ovary invading the intra-cecal area. Excretory vesicle not observed.

Host: small intestine of Eloisa nasus



Not common. Differs from Dolichosaccus in larger acetabulum and anterior position of the genital pore.

Comment: much like Allocreadiidae. Ex. vesicle important.

Sciencia medica
vol. 2 p. 1-11 ?

Dolichosaccus polymorphus

Plagiorchidae

Dolichosaccus diamesus Johnston,1912

Small, elongated, fairly delicate worms, becoming narrower towards the extremities/ Integument fairly thick, spiny; ratio of oral to ventral sucker, 4:3. Excretory vesicle very wide and long. Genital pore just behind the intestinal fork. Testes smaller than the ovary,in the middle line, in the middle of the posterior half of the body, with their ends obliquely overlapping. Ovary close behind the ventral sucker and laterally placed. Copulatory organs and L. canal as in the genus. Vitelline glands of comparatively small follicles, extending anteriorly as far as the intestinal fork and inwards beyond the intestinal limbs, both in front of and behind the ovary. Eggs 36 by 21 μ/.
Host: Hyla freycineti in the stomach.
Locaition: Australia

Plagiorchidae

Dolichosaccus ischyrus Johnston,1912

Small elongated, fairly robust worms, about 3 mm long, not much narrower at the rounded ends. Integument thick, spiny. Suckers fairly close together; ratio of oral to ventral, 4:3. Excretory vesicle vary wide and long. Genital pore just behind intestinal fork. Testes smaller than the ovary, one close behind the other in the middle line, at the middle oft the posterior half of body. Ovary large, rounded or oval, in the middle line,nearer the ventral sucker than in D. trypherus. Vitelline glands of moderately larger follicles, closely packed together, extending anteriorly right up to the oral sucker, in front of the ovary laterally placed, but in the posterior part of the body spreading under the whole surface. Uterine loops mainly in front of the ovary. Eggs 42 μ long.
Hosts: Limnodynastes dorsalis and Hyla coerulea in the intestine.
Locality; Austrailia

Dolichosaccus juvenilis (Nicoll, 1918)

Figure from
Travassos, 1930

FAMILY PLAGIORCHIIDAE

Dolichosaccus lygosomae n. sp. FISCHTHAL AND KUNTZ, 1967

(Fig. 3)

HOST: *Lygosoma noctua* (Lesson) (Scincidae).

HABITAT: Small intestine.

LOCALITY: Espiritu Santo Island, New Hebrides Islands.

DATE: 19 August 1944.

HOLOTYPE: USNM Helm. Coll. no. 61722.

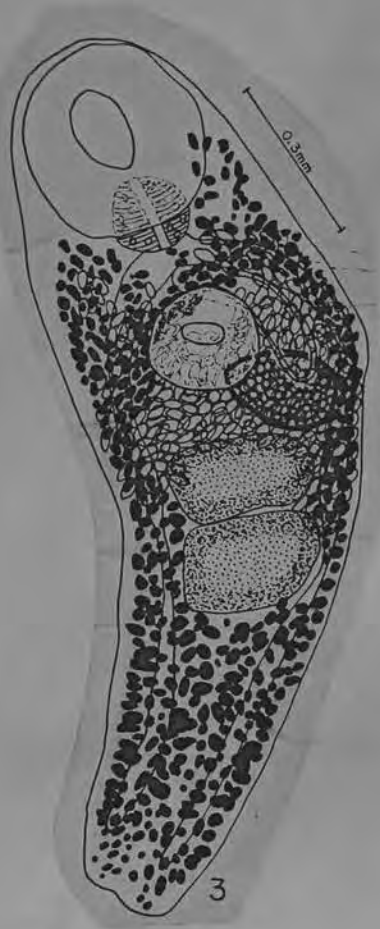
DIAGNOSIS (based on single specimen): Body 1,670 by 550, elongate, widest at acetabular level, tegument entirely spined, spines more numerous and coarser anteriorly. Forebody 510, hindbody 985; preoral body 6, postesticular space 580, postcecal space 123 (left), 143 (right). Oral sucker 336 by 310, subterminal ventral, opening longitudinally elongate. Acetabulum 175 by 188, at level of anterior body third. Sucker length ratio 1:0.52. Prepharynx short, pharynx 133 by 128, overlapping oral sucker dorsally, esophagus short, bifurcating preacetabular; ceca narrow, thick walled, extending close to posterior extremity.

Testes two, tandem, contiguous, transversely elongate, intercecal but may overlap ceca dorsally, surfaces somewhat wavy; anterior testis 140 by 265, 80 postacetabular; posterior testis 218 by 280, 210 postacetabular. Cirrus sac 280 (longitudinal extent) by 121, thick walled, muscular, curved, commencing over anteroventral part of ovary just anterior to level of posterior margin of acetabulum, partly overlapping sinistral and anterior half of latter, containing seminal vesicle, pars prostatica, prostate cells and cirrus. Seminal vesicle large, thin walled, bipartite (posterior chamber saccular and much larger than anterior), filling over half of cirrus sac; pars prostatica relatively large, cell lined; cirrus short, muscular; prostate cells surrounding pars prostatica and cirrus. Genital pore median, just preacetabular.

Ovary 140 by 215, relatively smooth, sinistral, lying 5 pretesticular, slightly overlapping left cecum and acetabulum dorsally. Ootype complex posteromedial to ovary. Seminal receptacle 68 by 130, overlapping anterior testis dorsally. Laurer's canal muscular. Uterus ventral to ovary, ootype complex, ceca, lateral margins of anterior testis, anterosinistral margin of posterior testis, and cirrus sac, extending to body margins at ovarian level, anteriormost extent to pharyngeal level. Vitelline follicles extensive, from posterolateral level of oral sucker to posterior extremity, confluent dorsally between cecal bifurcation and ovary and filling posttesticular space. Eggs yellow, operculate, 10 measuring 38–43 by 22–26.

Excretory bladder Y-shaped; stem elongate tubular, bifurcating at anterior part of posterior testis; arms extending to level of posterior part of ovary, left arm overlapping latter dorsally; stem and arms dorsal to testes; pore terminal.

DISCUSSION: This is the first record of *Dolichosaccus* S. J. Johnston, 1912, from a reptile; all other species are from amphibians from Australia, Brazil, Europe, and the Congo (Leopoldville). Manter and Pritchard (1964) noted that only four species of the eight recognized by Yamaguti (1958) have vitellaria extending to the pharynx–oral sucker level. Our species differs significantly from the four in the host being a lizard and in having the uterine coils extending to the pharyngeal level. It differs further from them, excepting *D. rastellus* (Olsson, 1875) Travassos, 1930 (from Europe and Africa), in having the vitellaria confluent anteriorly. Additionally, *D. ampliacus* Travassos, 1924 (Brazil) has the oral sucker smaller than the acetabulum; *D. ischyrus* Johnston, 1912 (Australia) has the ovary halfway between the acetabulum and anterior testis; *D. rastellus* has the ovary dextral; and *D. symmetrus* (Johnston, 1912) Yamaguti, 1958 (Australia) has the vitellaria in separate anterior and posterior masses.



Dalichosaccus (Lecithopyge) novaezealandiae sp. nov. Prudhoe, 1972

The material of this trematode consists of two specimens from the ileum of *Leiopelma archeyi* captured on the Totara Ridge, near Coromandel, North Island, New Zealand, one specimen from the intestine of *Leiopelma hochstetteri* as "New Zealand" and three specimens from *L. hochstetteri* from Mangakakariki Stream, inland from Te Araroa, East Cape Province, North Island, New Zealand. Unfortunately, five of the specimens are rather distorted in form, but the sixth specimen is in a reasonable condition for description. Nevertheless, information obtained from a study of all the specimens available is included in the following account.

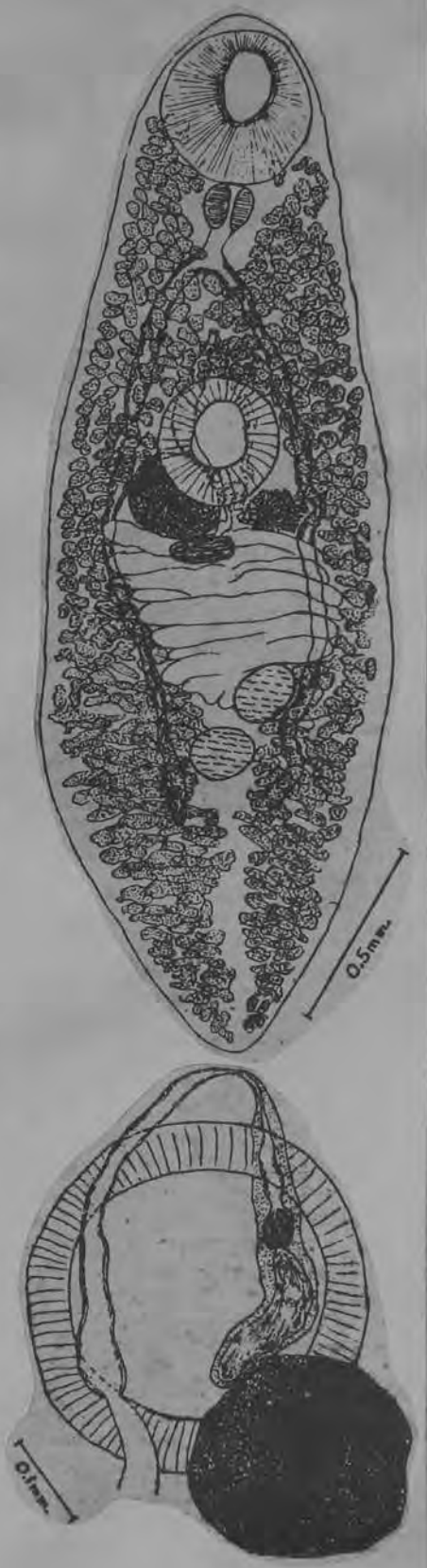
The body is fusiform, somewhat rounded anteriorly and tapering noticeably posteriorly. In size the mature specimens are variable, the smallest being about 1.4 mm. in length and 0.46 mm. in maximum width, and the largest about 2.8 mm. and 1 mm., respectively. The integument is provided with small scale-like spines, which are disposed in transverse rows, extending to the posterior region of the body. The oral sucker is subterminal and varies from 0.24 mm. to 0.38 mm. in diameter. The ventral sucker is smaller, ranging from 0.2 mm. to 0.36 mm. in diameter, and situated at about the anterior third of the total length of the body. The ratio of oral sucker to ventral sucker is 1: 0.8-0.9. The oral sucker leads into a short prepharynx, opening into a muscular pharynx, which may be globular, about 0.87 mm. in diameter, or a little longer than wide, 1-1.2 mm. by 0.8-1.1 mm. In all instances the diameter of the pharynx is a little less than one-third of that of the oral sucker. The oesophagus is about as long as the pharynx and bifurcates at about midway between the suckers. The intestinal caeca are relatively narrow, lined with a tall epithelium, and extending to about the hinder fifth of the body. The right caecum may reach a little further posteriorly than the left. The extent of the excretory vesicle has not been made out.

The genital pore is situated more or less in the median line, close in front of the ventral sucker. The cirrus-sac is elongate, lying dorsally or latero-dorsally to the ventral sucker and extending posteriorly to near the hinder margin of the sucker. It contains a smooth cirrus, a moderately-developed pars prostatica and a comparatively large seminal vesicle, which is constricted into two chambers, the posterior being distinctly larger than the anterior. The cirrus-sac varies in size from 0.2 mm. long and 0.044 mm. wide to 0.32 mm. and 0.056 mm., respectively.

The testes are situated in the median field at about the hinder fifth of the body-length, between or a little in front of the ends of the intestinal caeca. They are smooth and more or less rounded, usually disposed obliquely one behind the other, the left testis being the foremost. Sometimes, however, the testes are arranged one directly behind the other, in which case they are transversely oval or longitudinally elongate, the former condition being the result of contraction and the latter of excessive relaxation of the body. When rounded, the testes are between 0.12 mm. to 0.16 mm. in diameter, when transversely oval 0.18-0.2 mm. by 0.32-0.34 mm., when elongate 0.28-0.32 mm. by 0.12-0.14 mm. The ovary lies usually to the right of the median line, overlapping the postero-lateral margin of the ventral sucker. It is globular and measures between 0.08 mm. to 0.24 mm. in diameter. In the younger specimens the ovary is a little smaller than the testes, but in older specimens it is larger. There is an elongate receptaculum seminis lying in or near the median line behind the ovary. The oötype is very indistinct in the present specimens and lies to the left of the ovary. The vitelline glands consist of irregularly-shaped follicles, disposed laterally, but also overlying the intestinal caeca dorsally and ventrally, and extending from the oral sucker to the posterior end of the body, or near to it. In front of the ventral sucker and behind the posterior testis the follicles are confluent in the median line. Occasionally, the median area behind the posterior testis is free of follicles. The uterine coils lie between the ovary and the testes, frequently extending laterally beyond the intestinal caeca to the margins of the body. The vagina is long and thin walled. The eggs measure 0.042-0.047 mm. × 0.025-0.030 mm. The egg-shell is relatively thick and its surface is covered with small tubercles. In many of the eggs the shell has a thickening at the opercular pole, which often appears as a very small cylindrical boss.

The new form resembles very closely *D. (L.) lygosomae* Fischthal and Kuntz and *D. (L.) rastellus* (Olsson) in that the vitelline follicles in the anterior region of the body are confluent in the median line, at least in the dorsal paren-

(over)



hyma. It differs from *D. lygosomae* in s larger eggs, and from *D. rastellus* in s smaller cirrus-sac, which does not ach posteriorly beyond the ventral icker. Nevertheless, its most readily finable character appears to be the all tubercles on the egg-shell, a feature t described hitherto in any species of *olichosaccus*.

Unfortunately, it is not yet possible to whether *D.* (*L.*) *novaezealandiae* is cific to *Leiopelma*, because three cies of the genus *Hyla* appear to have en introduced into New Zealand from stralia in recent times, and the para- s of these frogs might have included s trematode which was able to adapt itself to new intermediate hosts and become established satisfactorily in the new locality.

(over)

Dolichosaccus (*Lecithopyge*) *rastellus* (Olsson, 1876)

Synonymy: *Distomum rastellum* Olsson, 1876; *Opisthioglyphe rastellus* Looss, 1907; *Lecithopyge rastellum* Perkins, 1928

The following description is based on the examination of over 40 specimens from the intestine of *Rana temporaria* from various English localities, and 4 specimens from the duodenum of *Rana temporaria parvipalmata* from the Province of Alva, Spain.

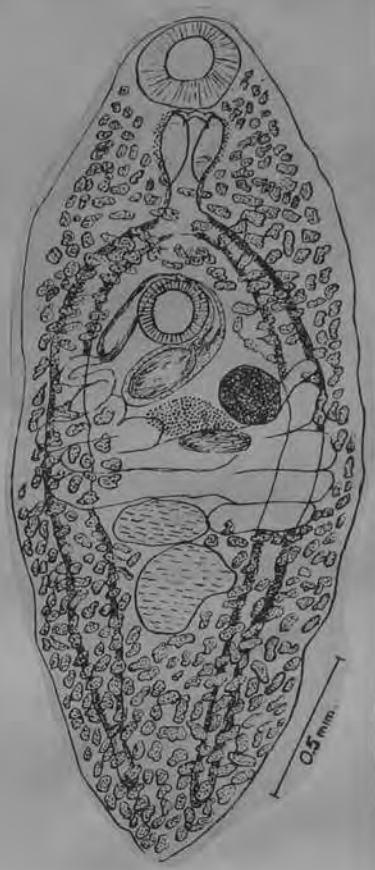
The body is fusiform or elongate oval, rounded anteriorly and tapering posteriorly. Mature specimens vary considerably in size, ranging from 1.3 mm. long and 0.5 mm. wide to 4.2 mm. and 1.2 mm., respectively. Cuticular spines are arranged quincuncially in transverse rows extending to the hinder end of the body. The oral sucker is subterminal and measures 0.18 mm. to 0.38 mm. in diameter. The ventral sucker is situated at or somewhat behind the middle of the anterior half of the body and has a diameter varying between 0.11 mm. and 0.29 mm. The ventral sucker/oral sucker ratio is 1: 1.2-1.5. A short prepharynx is often distinguishable and the pharynx is more or less globular, measuring 0.12 mm. to 0.24 mm. in transverse diameter. The pharynx/oral is 1: 1.5-2.0. The pharynx in uncontracted specimens is campanulate, with a crenate margin showing six scollops, and even in some contracted specimens indications of the scollops may be recognized. The oesophagus is about as long as the pharynx and its walls are composed of an inner layer of strong longitudinal muscle-fibres and an outer layer of strong circular fibres. It appears to be lined with a thin cuticle. Often the oesophagus and pharynx appear to be invested with a thick nucleated tissue. The oesophagus bifurcates about midway between the suckers and opens into a pair of intestinal caeca, which extend in to the hinder region of the body, where one caecum often extends further posteriorly than the other. The caeca are lined with a tall epithelium.

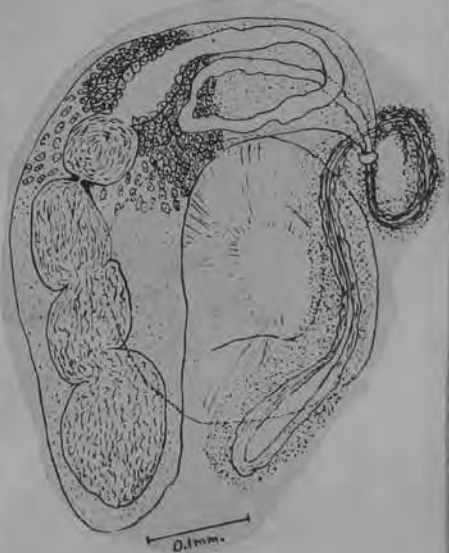
The genital pore may be situated in the median line immediately in front of the ventral sucker, but much more often it lies to the left on the antero-lateral border of the ventral sucker. The cirrus-sac is a well-developed, usually arcuate structure, extending posteriorly well beyond the hinder margin of the ventral sucker to reach the ovary. It contains a voluminous seminal vesicle, which is constricted into a broadly cylindrical hinder portion and a relatively small bulbous anterior portion opening into a thick-walled prostatic organ surrounded by numerous prostatic glands. The latter organ is followed by a narrow ejaculatory duct that soon becomes modified into a smooth cirrus, often found protruding through the genital opening and sometimes reaching a length of 0.5 mm. The cirrus-sac varies in size from 0.34 mm. long and 0.12 mm. wide to 0.64 mm. long and 0.18 mm. wide.

The testes are globular, 0.16 mm. to 0.4 mm. in diameter. In some specimens the anterior testis has a greater diameter than the posterior, whilst in other specimens the latter testis is the larger. They lie one behind the other, either directly or somewhat diagonally, between the intestinal caeca at about midway between the ventral sucker and the posterior end of the body. The ovary is situated to the right of the median line, laterally to the hinder region of the cirrus-sac, which passes between the ovary and the ventral sucker. It is rounded and has a diameter varying between 0.1 mm. and 0.3 mm., usually being smaller than either of the testes. An elongate receptaculum seminis lies at about midway between the ovary and the testes. The oötype is quite distinct in some specimens and is situated in the median region, close behind the ovary and the cirrus-sac. The irregularly-shaped vitelline follicles extend from the oral sucker to the posterior end of the body in the lateral regions, overlapping the intestinal caeca dorsally and ventrally. Behind the testes the follicles are confluent in the median line, and in the oesophageal region they are confluent dorsally, only occasionally ventrally. The uterine coils are disposed in transverse slings, mainly between the ovary and the testes, and extending to the lateral margins of the body in this region. The coils may also encroach into the fields lateral to the testes. The musculo-membranous is invested with numerous gland-cells and is almost as long as the cirrus-sac. The eggs measure 0.045-0.050 mm. x 0.022-0.025 mm. The shell is smooth and often there is a blunt boss at the anopercular pole.

As stated above, the writer has had the opportunity of studying the holotype and paratype specimens of the subspecies *Dolichosaccus (Lecithopyge) rastellus subulatus* (Perkins), from *Rana temporaria* and *Bufo bufo* in England, and the holotype of *D. (L.) rastellus cylindriformis* (Perkins) from *Rana temporaria* in England or France. Although allocating

(over)





subspecific names to these forms, Perkins (1928) merely regarded them as geographical races of the typical form described by Olsson (1876) from *Rana temporaria* and *Bufo bufo* in Sweden. On the other hand, Pekins did indicate morphological differences between the subspecies, and the specimens described above agree with his subspecies *subulatus*. The type-specimen of *D.* (*L.*) *r. cylindriformis* appears to have been much flattened, and this condition probably accounts for the size of the body, suckers and eggs appearing to be larger than that normally found in *D.* (*L.*) *r. subulatus*. The typical form of *D. rastellus* from Sweden is, by modern standards, inadequately described, but it appears to differ, according to Perkins, from the subspecies *subulatus* in having a distinctly smaller cirrus-sac, as well as smaller eggs, but until further specimens are described from Sweden, the question of whether or not the Bristish and Swedish forms are really distinct subspecifically cannot yet be resolved with any certainty.

Manter and Pritchard (1964) have recorded and described *D.* (*L.*) *rastellus subulatus* from *Bufo regularis* in the Congo. Their specimens appear to agree in almost every respect morphologically with the English specimens described above. There is, however, an important difference, for the Congolese specimens are said to possess a cirrus covered with minute spines. In none of the well-preserved English specimens has this feature been seen, so if the observation of Manter and Pritchard be correct, then it suggests that the English and Congolese specimens are taxonomically distinct from one another. To settle this question satisfactorily a first-hand comparative study of specimens from both localities seems to be necessary, perhaps more particularly because no other opisthoglyphine trematode is known to possess a spiny cirrus.

Yamaguti (1958) listed 8 species of the genus *Dolichosaccus* and these included *D. amplicava* Travassos, 1924, from frogs in South America. Travassos (1930), however, transferred this species to the genus *Opisthioglyphe*, and there seems to be no reason why this later assignation should not be accepted, especially as the species does not possess the principle feature of *Dolichosaccus*, namely, a bipartite seminal vesicle. Subsequently to 1958, a further species, *D. lygosomae* Fischthal and Kuntz, was described from a scincid reptile in the New Hebrides.

The known geographical distribution of *Dolichosaccus* presents a rather interesting pattern, for of its 9 recorded species, six occur in Australia, one, *D. rastellus*, in Africa and Europe, one, *D. lygosomae*, in the New Hebrides and one, *D. novaezelandiae*, in New Zealand. These three latter species show a much closer morphological resemblance to each other than they do to the Australian species and constitute the subgenus (*Lecithopyge*).

These facts might suggest that the genus *Dolichosaccus* evolved in Australia, where its greatest morphological diversity appears to have occurred, and that a dominant species radiated from there into regions now known as southern Africa and the Pacific Islands. If such were the case, then it is also conceivable that this dominant species still exists in the form of *Dolichosaccus* (*L.*) *rastellus*, which reached southern Africa and, after the separation of the southern continents in Cretaceous times, spread northwards into the western Palaearctic region, while its representatives in the Pacific underwent speciation through geographical isolation. The indication that a form belonging to *Dolichosaccus* (*Lecithopyge*) does not occur in Australia, but does in the surrounding areas, appears to qualify a principle of zoogeographers that centres of evolution and dispersal are also likely to be centres of extinction (Darlington, 1957). Nevertheless, it must be realized that relatively little is known of the helminths of amphibians and their distribution in the southern hemisphere, and until much more information on this subject becomes available it seems pointless to conjecture further on the origin of *Dolichosaccus* or on the evolutionary pattern of its distribution.

From Prudhoe, 1972

Dolichosaccus rastellus subulatus (PERKINS, 1928) DAWES, 1946. — Synonym : *Lecithopyge rastellum subulatum* PERKINS, 1928 (fig. 12-14).

Host : *Bufo regularis* REUSS; 127 specimens in intestine.
Locality : Kasongo (Maniema).

Specimens deposited : Mus. Roy. Afr. Centr., nrs 32.872/902. — U. S. Nat. Mus. Helminth. Coll., nr 59.630.

Description (15 specimens measured) : Body spined anteriorly, 1.126 to 2.220 long by 0.574 to 0.925 wide; rounded anteriorly, more tapered posteriorly, widest at acetabular or testicular level. Oral sucker rounded, 0.228 to 0.315 in diameter; acetabulum transversely oval, 0.181 to 0.261 wide by 0.134 to 0.201 long; sucker ratio 1 : 0.64 to 0.8. Prepharynx short, directed dorsally; pharynx rounded, 0.141 to 0.201 in diameter; œsophagus slightly shorter than pharynx; caeca extending to near posterior end of body.

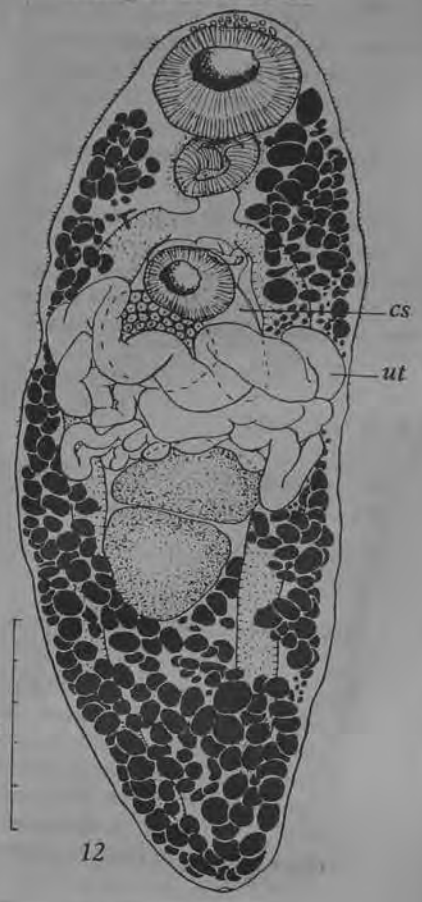
Testes rounded or subspherical, in middle of hindbody, tandem to diagonal, anterior testis displaced to left if not tandem. Cirrus sac (fig. 13) thick-walled, longitudinal muscles conspicuous, 0.288 to 0.435 long by 0.107 to 0.147 wide, extending anterodextrally dorsal to acetabulum, then turning ventrosinistrally to enter short genital atrium. Seminal vesicle bipartite; posterior part large, wide, somewhat sinuous, occupying basal third to half of cirrus sac; anterior part small and rounded. Pars prostatica pyriform to elongate, about twice as long as anterior part of seminal vesicle. Ejaculatory duct descending near seminal vesicle, then ascending to base of cirrus (near anterior end of pars prostatica). Cirrus almost straight, protrusible at least half its length; tip covered by minute spines (fig. 14). Genital atrium short, thin-walled; genital pore immediately preacetabular and slightly sinistral.

Ovary dextral, immediately postacetabular, between right caecum and median line, subglobular, 0.134 to 0.290 in diameter. Mehlis' gland large, rounded, posteromedian to ovary. Laurer's canal coiling to level of anterior testis; pore dorsal, submedian. Uterus pretesticular; transverse coils overlapping caeca, ovary, and anterior edge of anterior testis. Metraterm muscular, with both circular and longitudinal muscles, paralleling anterior half of cirrus sac. Vitellaria lateral, from oral sucker to posterior end of body, often discontinuous at uterine level; dorsal, lateral, and ventral to caeca; extending medianly, meeting or not, dorsal to bifurcation; more or less filling posttesticular space both dorsally and ventrally. Eggs yellow, usually 0.040 to 0.043 long by 0.021 to 0.026 wide, but length varies from 0.034 to 0.046.

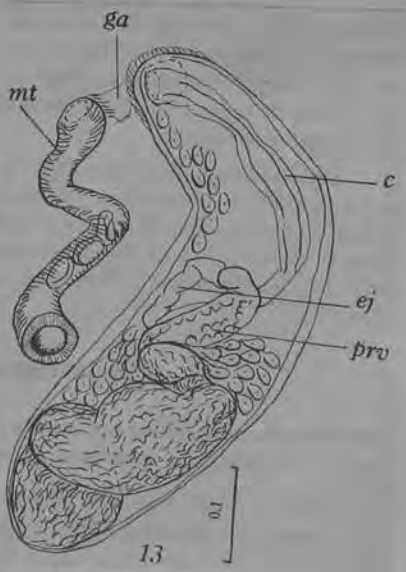
Excretory vesicle Y-shaped, stem often sinuous, bifurcating at level of anterior testis; arms short, extending to level of ovary or acetabulum.

Discussion : The bipartite seminal vesicle separating *Dolichosaccus* JOHNSTON, 1912, from *Opisthioglyphe* LOOSS, 1899, is clearly present in these specimens. YAMAGUTI (1958) recognized 10 species of *Dolichosaccus* (including the subspecies of *D. rastellus*), but only four of these have vitellaria extending forward to the pharyngeal-oral sucker level. In contrast to the Congo specimens, *D. amplicavus* TRAVASSOS, 1924, has an acetabulum considerably larger than the oral sucker; *D. ischyrus* JOHNSTON, 1912, has the ovary at midbody, posterior to the cirrus sac, and halfway between the anterior testis and the acetabulum; *D. symmetrus* (JOHNSTON, 1912) YAMAGUTI, 1958, has the vitellaria in two widely separated masses, one in the forebody, the other in the hindbody. The Congo specimens are identified as *D. rastellus* (OLSSON, 1875) TRAVASSOS, 1930.

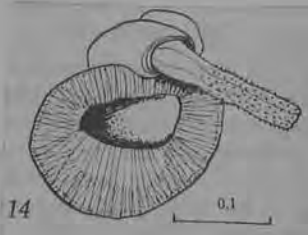
FROM MANTER AND PRITCHARD, 1964



12



13



14

- OVER -

PERKINS (1928) named three subspecies of *D. rastellus* : *D. r. rastellus*, *D. r. cylindriformis*, and *D. r. subulatus*. TRAVASSOS (1930b) did not recognize subspecies in this genus, but DAWES (1946) and YAMAGUTI (1958) retain them. PERKINS thought the subspecies represented geographical races, but DAWES believed them to represent morphological variations.

The Congo specimens differ from all three of the subspecies in being smaller. Terminal genital ducts of these subspecies have not been well described in the literature. In our specimens the seminal vesicle resembles that drawn by TRAVASSOS (1930b, fig. 24) for the species. Spines on the cirrus have not been previously reported, but these spines are minute and could be lost or overlooked.

The egg size, attenuated hindbody, position of the genital pore, and length of the cirrus sac of our specimens resemble those of *D. r. subulatus* reported from England. In view of the variations accepted by PERKINS, DAWES, and others, we consider these specimens indistinguishable from *D. r. subulatus*. This is the first report of a *Dolichosaccus* species from Africa.

FROM MANTER AND PRITCHARD, 1964

LOOSE LEAF
ORGANIZER

POLICY BINDERS

SCHEDULE

PERIOD OR TIME								
COURSE MON. INSTRUCTOR								
COURSE TUE. INSTRUCTOR								
COURSE WED. INSTRUCTOR								
COURSE THU. INSTRUCTOR								
COURSE FRI. INSTRUCTOR								
COURSE SAT. INSTRUCTOR								

NAME

ADDRESS

SCHOOL TELEPHONE

Encyclobrephus Sinha, 1949

Generic diagnosis. — Plagiorchiidae, Plagiorchiinae: Body very small, spinose, elongate, tapered posteriorly. Oral sucker subterminal, larger than acetabulum, prepharynx distinct, pharynx well developed. Esophagus very short, ceca wide, reaching almost to posterior extremity. Acetabulum small, pre-equatorial. Testes tandem, postequatorial, separated by uterine coils. Cirrus sac oblique, almost entirely pre-acetabular. Genital pore a little in front of acetabulum slightly to left of median line. Ovary posterolateral to acetabulum. Receptaculum seminis large, postovarian. Laurer's canal present. Vitellaria extracecal, cecal and intercecal, extending from level of intestinal bifurcation to behind testes. Uterine coils occupying posttesticular area and then passing between two testes; eggs very small, embryonated. Excretory vesicle Y-shaped, stem bifurcating at level of shell gland into short cornua reaching to level of acetabulum. Intestinal parasites of tortoises.

Genotype: *E. robustum* Sinha, 1949 (Pl. 56, Fig. 677), in *Hardella thurgi;* Lucknow.

ENCYCLOBREPHUS

Encyclometrinae nom. emend. for
Encylometriinae Mehra, 1931

Subfamily diagnosis. — Plagiorchiidae: Body fusiform to lanceolate, unspined. Oral sucker and pharynx well developed; esophagus short, ceca terminating at or near posterior extremity. Acetabulum moderately large, in anterior half of body. Testes tandem or diagonal, postequatorial or in middle third of body. Cirrus pouch anterior and anterodorsal to acetabulum; seminal vesicle winding. Genital pore submedian, preacetabular. Ovary submedian, posterodorsal to acetabulum. Receptaculum seminis small. Vitellaria extending nearly whole length of hindbody. Uterus reaching to posterior extremity, passing lateral or dorsal to testes. Excretory stem long, reaching to acetabulum.

Encyclometra Baylis et Cannon, 1924
Syn. *Odhneria* Baer, 1924, preoccupied
Paraplagiorchis Dollfus, 1924
Orthorchis Mödlinger, 1925

Generic diagnosis. — Plagiorchiidae, Encyclometrinae: Body fusiform to lanceolate, unspined. Acetabulum moderately large, in anterior half of body. Oral sucker and pharynx well developed. Esophagus short, ceca terminating at or near posterior extremity. Testes tandem or diagonal, postequatorial or in middle third of body. Cirrus pouch pre-acetabular or somewhat overlapping acetabulum, containing winding seminal vesicle, prostatic complex and protrusible cirrus. Genital pore anterosinistral to acetabulum. Ovary posterodextral or posterior to acetabulum, may or may not overlap the latter. Receptaculum seminis small. Vitellaria extending along ceca nearly whole length of hindbody. Uterus reaching to posterior extremity or not, passing lateral or dorsal to testes. Excretory stem reaching to acetabulum, giving off paired arms at its anterior end. Gastrointestinal parasites of snakes.

Genotype: *E. colubrimurorum* (Rud., 1819) Dollfus, 1929, syn. *Distomum allostomum* Dies., *D. subflavum* Sons., 1892, *Encyclometra bolognensis* (Baer, 1924) (Pl. 58, Fig. 70)? *E. natricis* Baylis et Cannon, 1924, *Orthorchis natricis* Mödlinger, 1925, *Paraplagiorchis timotheevi* Dollfus, 1924, in *Coluber murorum;* Europe. Also in *Tropidonotus piscator, T. natrix, Coluber gemonensis, Ptyas mucosus.* In *Rana tigrina;* Burma, Ceylon, India.

Other species:

E. asymmetrica Wallace, 1936, ? syn. of *E. microrchis* Yamaguti, 1933, in esophagus and stomach of *Natrix piscator, N. stolata, Enhydris chinensis, E. plumbea, Ptyas korros, P. mucosus;* China. Also in *Macropodus opercularis, Ooeidozyga lima.* Experimentally in *Taxydromus sexlineatus meridionalis, Calotes versicolor.*

E. caudata (Polonio, 1859) Dollfus, 1928, in *Natrix torquata, Tropidonotus viperinus;* Padua. Also in *Tropidonotus piscator, Zamenis mucosus;* India.

E. japonica Yoshida et Ozaki, 1929, in *Elaphe quadrivirgata* and *Natrix tigrina;* Japan.

Metacercaria encysted in muscles of *Rana nigromaculata* and *Misgurnus anguillicaudatus;* adults obtained experimentally in *Elaphe quadrivirgata* and *E. climacophora* — Yamaguti (1936).

E. koreana Park, 1940, in *Elaphe dione, E. tigrina, Ancistrodon blomhoffi brevicaudus;* Korea. Larva in *Ooeidozyga lima, Rana rugulosa, R. limnocharis;* adult experimentally in *Taxydromus sexlineatus meridionalis, Calotes versicolor* and *Natrix piscator* — Ching (1951).

E. microrchis Yamaguti, 1933, syn. of *E. japonica* Y. et O. — Park (1940), in *Enhydris plumbea;* Formosa.

E. vitellata Gupta, 1954, in *Natrix piscator;* India.

Plagiorchidae

Plagiorchiidae

Encyclometra colubrimurorum (Rudolphi, 1819) Dollfus, 1929

HOST. *Enhydris plumbea* (Colubridae, syn. Hydrophiidae).

HABITAT: Small intestine.

LOCALITY: Ranau, North Borneo.

DATE: 22 October 1960.

SPECIMEN: U.S.N.M. Helm. Coll. No. 60948.

MEASUREMENTS and some pertinent data (based on single specimen): Body 3,250 by 1,067; forebody 893, hind body 1,866; preoral body 51, posttesticular space 1,112, oral sucker 453 by 377, acetabulum 491 by 525, sucker length ratio 1 : 1.08; pharynx 180 by 239; cecal bifurcation 162 preacetabular; posterior extremity to right cecum 430, to left cecum 376; testes slightly lobed, diagonal; anterior (left) testis 193 by 213, 345 postacetabular; posterior (right) testis 202 by 191, 552 postacetabular; cirrus sac 210 wide proximally, shaped like broad, inverted U with proximal part overlapping middle of acetabulum 165, mostly preacetabular; genital pore sinistrolateral to acetabulum; ovary 210 by 325, smooth, transversely oval, median, entirely dorsal to acetabulum; acetabulum to right vitelline field 199, to left field 253; posterior extremity to right vitelline field 215, to left field 261; vitelline reservoir dorsal to posterosinistral part of acetabulum and posterosinistral to ovary; uterus descending on right, ascending on left, ventral to testes; five eggs measuring 65 to 88 by 36 to 41.

DISCUSSION: Our record from North Borneo is new for *Encyclometra* Baylis and Cannon, 1924. The synonymy of species appears to be great, but complete accord as to which are valid is lacking. Yeh (1958) recognized only three species: *E. colubrimurorum*, *E. asymmetrica* Wallace, 1936, *E. japonica* Yoshida and Ozaki, 1929. Yamaguti (1958) listed seven species, and Skrjabin and Antipin (1960) reviewed six. Dollfus (1963b) recognized *E. colubrimurorum* and *E. asymmetrica*, but doubted the validity of *E. japonica* which he considered similar to the first species. Dollfus disagreed with much of Yeh's synonymy of species with *E. japonica* as most equally fit *E. colubrimurorum*; additionally, while Yeh declared *E. vitellata* N. K. Gupta, 1954, a synonym of *E. japonica*, Dollfus placed it in synonymy with *E. asymmetrica*. A knowledge of the complete life histories of the various species would aid considerably in clarifying the extent of synonymy. Until such information is available we prefer to follow Dollfus and therefore are listing our specimen as *E. colubrimurorum*. From the same host as our form has been reported *E. microrchis* Yamaguti, 1933, from Taiwan. On the basis of differences in the excretory system Odening (1960b) removed the genus from Plagiorchiidae and erected the family Encyclometridae, provisionally placing it in the suborder Plagiorchiata until the larval stages from the molluscan intermediate host were known.

FROM FISCHTHAL AND KUNTZ, 1965

Encyclometra colubrimurorum (Rudolphi, 1819) Dollfus, 1929

HOSTS: *Enhydris plumbea* (Boie), *Elaphe rufodorsata* (Cantor) (Colubridae).

HABITAT: Small intestine.

LOCALITIES: San-hm Village, Matsu Island (*E. plumbea*); 12 miles southwest of Seoul, Korea (*E. rufodorsata*).

DATES: 1 August (*E. plumbea*), 17 October (*E. rufodorsata*) 1961.

SPECIMENS: USNM Helm. Coll. No. 61704 (three slides with one specimen each from *E. plumbea*); No. 61705 (one slide with one specimen from *E. rufodorsata*).

MEASUREMENTS AND SOME PERTINENT DATA (based on eight adult and two immature specimens from *E. plumbea*, six adults measured, one adult from *E. rufodorsata*, measured): Body 1,955 to 5,460 by 575 to 1,375; forebody 450 to 1,875, hindbody 1,217 to 3,050, preoral body 39 to 56, posttesticular space 735 to 1,540; oral sucker 255 to 450 by 300 to 502, acetabulum 315 to 535 by 335 to 585, center at level of anterior three- to four-tenths of body length; sucker length ratio 1:1.08 to 1.24; pharynx 157 to 252 by 121 to 295; short prepharynx and esophagus present; cecal bifurcation 60 to 425 preacetabular; ceca subequal in length in nine specimens, equal in two, right usually shorter, posterior extremity to right cecum 390 to 680, to left cecum 140 to 550; testes tandem to diagonal, smooth to slightly lobed; anterior testis 157 to 270 by 186 to 405, overlapping acetabulum 15 in one and 145 to 680 postacetabular in other six; posterior testis 182 to 335 by 180 to 405, 140 to 1,175 postacetabular; cirrus sac 225 to 635 (longitudinal extent) by 73 to 135, entirely preacetabular to considerably overlapping latter, nearly straight to much recurved; ovary 123 to 235 by 123 to 260, usually partly dorsal to acetabulum but may be entirely dorsal or postacetabular; right vitelline field commencing 115 anterior to posterior margin of acetabulum or up to 245 postacetabular, left commencing 142 anterior or up to 395 postacetabular; lateral vitelline fields separate posteriorly or may be confluent; posterior extremity to right vitelline field 110 to 325, to left field 95 to 180; 13 eggs 75 to 94 by 34 to 51.

DISCUSSION: Yeh (1958) reviewed the genus *Encyclometra* Baylis and Cannon, 1924, recognizing three species: *E. colubrimurorum*, *E. japonica* Yoshida and Ozaki, 1929, and *E. asymmetrica* Wallace, 1936. Dollfus (1963) recognized only two of these, declaring the second a synonym of the first. The recovery of *E. colubrimurorum* from Matsu Island, located off the coast of mainland China near Amoy, represents a new geographic distribution record; *Elaphe rufodorsata* is a new host species. It has been reported previously in *Enhydris plumbea* from North Borneo by us (1965) and from Formosa (as *Encyclometra microrchis* Yamaguti, 1933).

FROM FISCHTHAL AND KUNTZ (1967)

-OVER-

E. colubrimurorum **Rud (1819) and Dollfus (1931). The writer obtained 8 specimens of *E. colubrimurorum* from the oesophagus of the water snakes, and 45 specimens from the grass snake. The writer has nothing new to add to the description given by Mehra, 1931.**

From Simha, 1958

Plagiorchiidae

Subfamily: Encylometrinae Mehra, 1931
Genus: *Encylometra* Baylis & Cannon, 1924

Encylometra colubrimurorum (Rud., 1819) Dollfus, 1929
(Figs. 18-21)

A large number of specimens of this form were collected from the esophagus of *Tropidonotus piscator* (Wall.) at Lucknow.

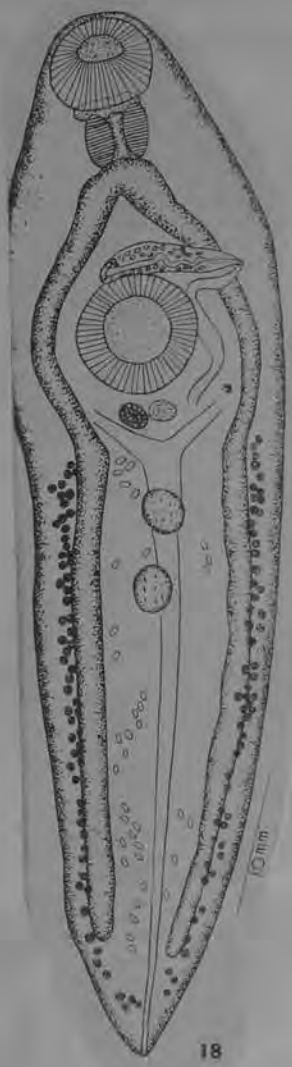
DESCRIPTION: Body espinose, fusiform, with rounded anterior and posterior ends tapering to a blunt point, measuring 6.35-7.43 × 0.97-2.15 mm in size. Oral sucker subterminal and subspherical, 0.56-0.78 × 0.56-0.78 mm in size. Prepharynx short and thin walled; pharynx well developed, ovoid, muscular, 0.25-0.48 × 0.37-0.50 mm in size; esophagus very short, immediately bifurcating into two intestinal ceca which occupy a lateral position near body wall, terminating at or near posterior extremity and equal or subequal in length; left cecum slightly longer than right one. Ventral sucker oval or spherical, larger than oral sucker, preequatorial, 0.74-0.834 × 0.74-0.86 mm in size at 1.572-2.080 mm i. e., about one third of body length from anterior extremity. Ratio of oral to ventral sucker is 3: 4.

Genital pore lies nearly half way between ventral sucker and left body margin, intercecal, cecal or extracecal, 1.76-2.32 mm from anterior extremity. Excretory pore lies at hind end of body. Excretory bladder Y-shaped. Main stem extends beyond testes, then divides into right and left branches.

Testes entire, subspherical, closely tandem or diagonal in median line in posterior half or in middle region of body. Anterior testis, 0.25-0.40 × 0.24-0.35 mm in size at 2.38-3.70 mm from anterior extremity. Posterior testis larger or smaller than anterior testis, 0.32-0.40 × 0.26-0.36 mm in size at 2.80-3.51 mm from hind end. Cirrus pouch crescent-shaped, lying transversely away or overlapping anterior border of ventral sucker, 0.675-0.980 × 0.22-0.26 mm in size. Vesicula seminalis elongated, tubular, straight or coiled in a spiral, 0.68-1.1 × 0.08-0.125 mm in size; pars prostatica narrow and tubular, 0.11-0.225 × 0.05-0.07 mm in size; ejaculatory duct tubular, 0.14-0.31 mm long. A large number of prostate gland cells surround space in cirrus pouch around vesicula seminalis and pars prostatica.

Ovary oval or rounded, median or submedian, close behind ventral sucker or slightly away from it. It measures 0.12-0.35 × 0.16-0.23 mm in size at 2.5-3.0 mm from anterior extremity. Receptaculum seminis oval, small, lying close on left side of ovary, 0.13-0.18 × 0.21-0.30 mm in size. Oviduct arises from ovary and opens at oötype. Vitellaria small, follicular, lying along ceca, extending from a little posterior to ventral sucker to caudal end of body. Two vitelline ducts run transversely to open at oötype. A large number of Mehlis's gland cells surround oötype. Uterus intercecal, convoluted, filling nearly entire space behind ovary. Ascending limb passes into metraterm which is dorsal to left side of ventral sucker. Eggs oval, non operculate, 0.069-0.118 × 0,032-0.061 mm in size.

HOST: *Tropidonotus piscator* (Wall.)
LOCATION: Esophagus.
LOCALITY: Lucknow.



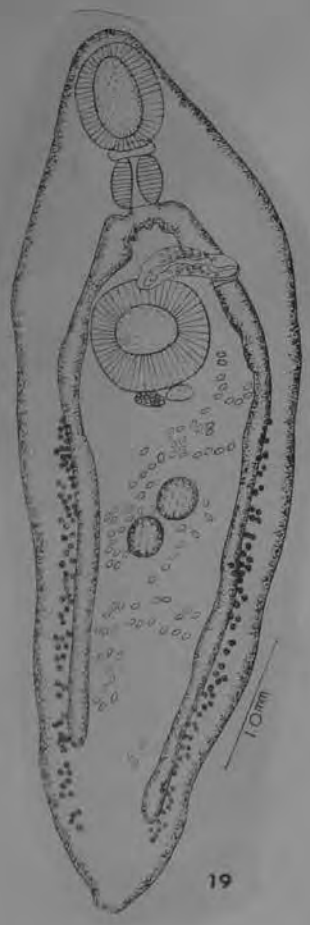
18

DISCUSSION: YAMAGUTI (15) listed the following species under the genus *Encylometra* Baylis et Cannon, 1924:

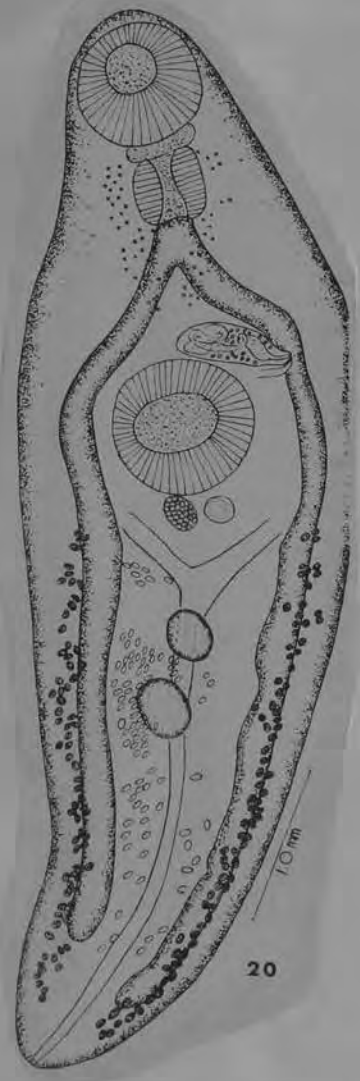
E. colubrimurorum (Rud., 1819) Dollfus, 1929 (syns. *E. bologenensis* (Baer, 1924), Baylis; *E. natricis* Baylis et Cannon, 1924; *E. asymmetrica* Wallace, 1936 (syn. *E. microrchis* Yamaguti, 1933); *E. caudata* (Polonio, 1859) Dollufus, 1928; *E. japonica* Yoshida et Ozaki, 1929; *E. koreana* Park, 1940; *E. microrchis* Yamaguti, 1933 (syn. *E. japonica* Yoshida et Ozaki, 1929); *E. vitellata* Gupta, 1954.

PARK (1940) considered *E. microrchis* to be a synonym of *E. japonica*. YEH (16) in a critical review of the genus recognised only three valid species viz. *E. colubrimurorum* (Rud. 1819) Dollfus, 1929; *E. japonica* Yoshida et Ozaki, 1929 (synonyms *E. microrchis* Yamaguti, 1933, *E. koreana* Park, 1940 and *E. vitellata* Gupta, 1954); and *E. asymmetrica* Wallace, 1936. He distinguished the species on the basis or relative length of ceca. In *E. colubrimurorum* the ceca are equal, in *E. japonica* subequal, while in *E. asymmetrica* they are very unequal, In the author's specimens the ceca are of variable length and in some cases they are "In *E. colubrimurorum* the ceca are quite equal and will not become otherwise unless distorted. In *E. japonica* the left cecum is only slightly longer than the right and they may look symmetrical when the specimen is contracted. Fortunately the contracted state is easy to observe as in *Encylometra* the caeca are straight and when the specimen is contracted the caeca become wavy."

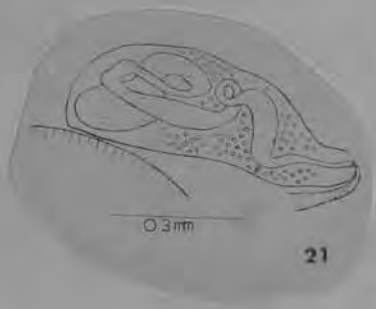
The author wishes to point out that in the collection of her well preserved specimens the ceca in four specimens are equal and straight while in the other specimens they are subequal and straight. Hence the relative length of ceca, equal or subequal, is a variable character and cannot be considered as a main basis for distinguishing *E. colubrimurorum* from *E. japonica*. Consequently *E. japonica* falls into the synonymy of *E. colubrimurorum*.



19



20



21

Plagiorchidae

Lepodermatidae

Encyclometra asymmetrica Wallace, 1936

Length: 4.48 mm.
Width: 1.07 mm.
} Dimensions of mature specimens vary from 7.16 mm X .9 mm. to 3.2 mm X 1.5 mm. depending on the degree of contraction.

Oral sucker: Subspherical, sometimes slightly elongate, opens ventrad, .385 mm wide.
Acetabulum: (size:) .431 mm. wide, sometimes slightly elongate.
(position): At posterior limit of anterior 1/5 of body length.
Sucker ratio:

Esophagus: Very short.
Pharynx: Ovoid, .150 mm wide

Genital pore (location): A considerable distance to left of and about level of middle of acetabulum.
Testes, shape: elongate to transversely elongate.

location: Tandem or diagonal in middle third of body.
Cirrus sac (extent): Total length about .385 mm. Not posterior to acetabulum.
Ovary, shape: Sub-spherical.

location: Dorsal to posterior margin of acetabulum, slightly to right.
Vitellaria: Small rounded follicles in two more or less regular lines on either side of body extending from posterior end nearly to ovary. Are ventral to intestinal caeca.
Eggs: .088 mm in length.

Other features:

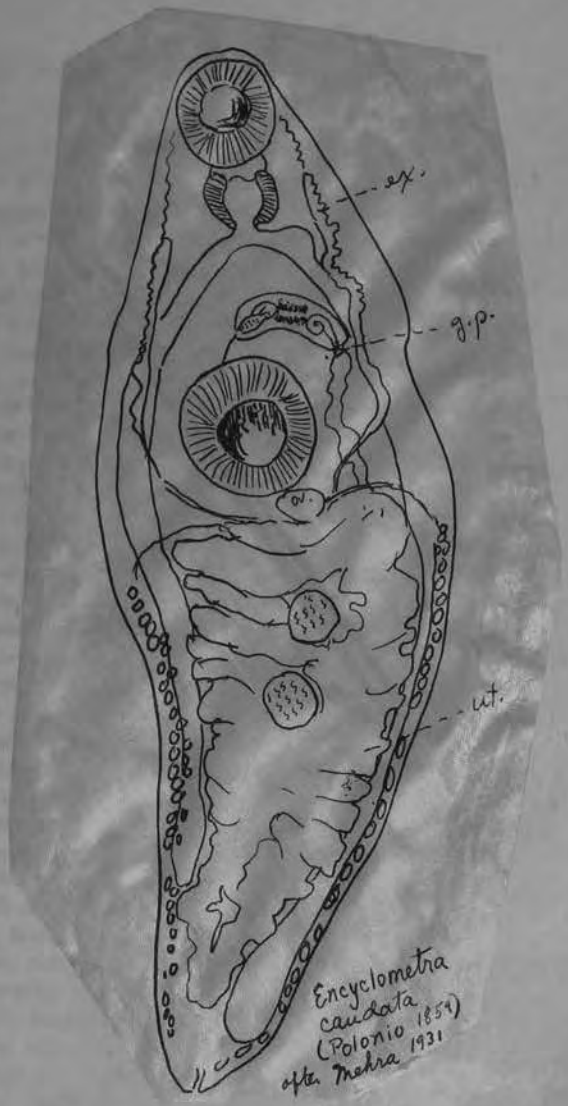
Host: Natrix piscator (Schneider), Natrix stolata (L.), Enhydris chinensis (Gray), Enhydris plumbea (Boie), Ptyas korros (Schlegel) and Ptyas mucosus (L.)
Locality: Canton, China

Reference: Lingnan Science Journal, Vol. 15, No. 3, pages 355-364.

Comparisons: E. caudata (Polonio 1859), E. japonica Yoshida & Ozaki 1929, E. microrchis (Yamaguti, 1933).

Life cycle:

f3568p1b



Encyclometra caudata (Polonio 1859) after Mehra 1931

Encyclometra koreana ~~sp. nov.~~ PARK, 1940

(Plate XI, figs. 1-4 and textfigs. 1-3)

Description. Body elongated, round anteriorly and tapering posteriorly, dorsoventrally flattened, 1.80-6.70 mm. in length by 0.65-1.75 mm. in width at the level of the anterior testis; preoral lip present; cervical glands present, opening dorsally at the anterior body region revealed in sections; oral sucker subterminal, 0.19-0.43 mm. in length by 0.19-0.43 mm. in width; ventral sucker at 0.20-0.31 length of anterior part from the anterior end of the body, slightly larger than the oral sucker, 0.28-0.54 mm. in length by 0.28-0.59 mm. in width; prepharynx short; pharynx muscular, 0.14-0.26 mm. in length by 0.14-0.33 mm. in width; oesophagus short, but indistinct in whole mount; intestinal caeca smooth or wavy, symmetrical or asymmetrical, extending to 0.23-0.09 length of posterior part from the posterior end of the body; genital pore anterior to the acetabulum, near the body margin, ventral to the left caecum; genital atrium present; cirrus sac ellipsoidal or rarely eggplant-shaped with its longer axis transverse or oblique, located anterior to the acetabulum; seminal vesicle within the cirrus sac, curled or sinuous; pars prostatica, long ejaculatory duct, prostate cells and cirrus present within the anterior portion of the cirrus sac; testes subspheroidal, entire or lobed, obliquely tandem, preequatorial or rarely equatorial, touched or separated from each other: the anterior testis 0.12-0.47 mm. in length by 0.17-0.40 mm. in width, located toward the left from the median line; the posterior testis 0.15-0.52 mm. in length by 0.21-0.38 mm. in width, located toward the right from the median line; ovary spheroidal, immediately posterior or lateral to the acetabulum, 0.11-0.26 mm. in length by 0.11-0.24 mm. in width, located toward the right or left from the median line; MEHLIS' glands diffused to the left of the ovary; vitelline reservoir small; seminal receptacle elongated, various in size revealed in sections, located latero-posterior to the ovary; coils of uterus transverse, largely intercaecal, filled numerous or few eggs, extending from the level of the ovary to near the posterior end of the caeca or body; metraterm dorsal or latero-posterior to the cirrus sac; eggs yellowish-brown, 0.067-0.092 × 0.029-0.048 mm.; vitellaria well developed, laterally marginal [illegible] the inner margin of the caeca, extending from the posterior level of the ovary to near the posterior end of the body; excretory pore posteriorly terminal; excretory bladder simple or Y-shaped, voluminous, extending to the middle level of the ovary; prominent paired ducts from the anterio-lateral tips of the bladder, extending along the outer margins of the caeca to the region of the pharynx.

Host. Elaphe dione, Natrix tigrina and *Ancistroden blomhoffi brevicandus.*

Habitat. Stomach and lower part of oesophagus.

Locality. In the vicinity of Keizyô, Tyôsen (Korea); in 1937 and 1938.


1


2

3

Study notes. In the study of *Encyclometra koreana*, it was found that individual variations including one abnormal form were occured in a wide range as follows: (1) the size of body; (2) testes entire or lobed; (3) testes touched or separated from each other; (4) ovary located posterior or lateral to acetabulum; (5) intestinal caeca symmetrical or asymmetrical; (6) cirrus sac ellipsoidal or eggplant-shaped.

Relationships. Of the described species of the *Encyclometra*, *E. koreana* is most closely related to *E. japonica* upon the host and in the shape of body and topography of organs. However, it may be distinguished the former from the latter mainly by the structure of seminal vesicle. The seminal vesicle in *E. koreana* is curled or sinuous whereas it is simple sac-shaped and straight in *E. japonica*.

Discussion. As the table I shows, there are individual variations in a wide range in *E. koreana*. Consequently, it is not easy task to find some characters which are reliable to be considered as specific. The morphological structure of the seminal vesicle in *E. koreana* is constant throughout the specimens examined. Further, according to OLSEN (1937) and MEHRA (1938), the structure of seminal vesicle in the family Plagiorchidae WARD, 1917, seems to possess the value of a generic character. Under the circumstances the discrepancy between *E. japonica*

—OVER

and *E. koreana* in the character of the seminal vesicle can hardly be considered as an individual variation at the present moment.

Encyclometra japonica and *E. microrchis* are very similar in the size of the body, topography of organs and sizes of the organs with the exception of the host and the size of testes. Regardless of these facts, the separation of the latter from the former as a distinct species was made on the ground of the small size of testes and distribution of uterus toward the posterior end of the body, which are variable in a wide range according to the stage in general or to individual variations as well as to the different hosts. In regard to the character of testes, various stages of degeneration are occured in some fish trematodes as in the case of *Helicometra execta* LINTON, 1910. It may be possible that the conditions of the testes and uterus in *E. microrchis* are due to a possible host influence as the possibility of such case was noted already by MANTER (1933). In regard to the structures of the caeca, WALLACE (1936) has confirmed on the ground of forty three specimens of *Encyclometra asymmetrica* studied that the asymmetrical intestinal caeca is a specific character to separate *E. asymmetrica* from *E. caudata*. However, as the table I shows, it is not a specific, but one of individual variation in *E. koreana*. Considering the individual variations in a wide range in the members of the *Encyclometra*, it has been decided to consider that *E. microrchis* should fall into the synonymy of *E. japonica*.

YAMAGUTI (1933) has suggested that the cervical glands in *E. japonica* apparently opened at the anterior border of the oral sucker. However, in *E. koreana* one of the cervical glands is demonstrated to be opened dorsally at the level of the pharynx as the textfig. 1 shows. Therefore, it may be said that the cervical glands open dorsally at the region of the pharynx in *E. koreana* and *E. japonica* in contradiction to the YAMAGUTI's description.

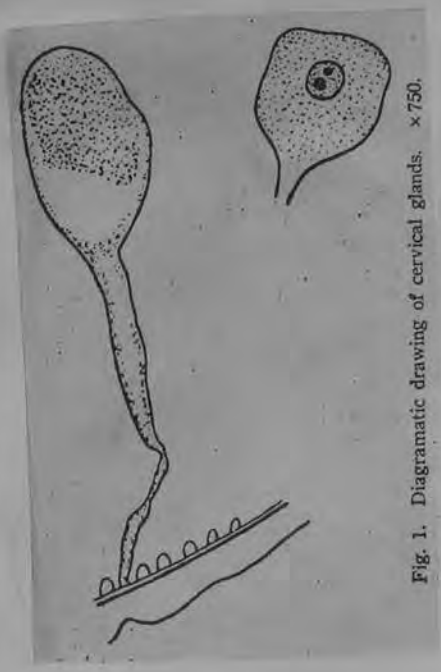


Fig. 1. Diagramatic drawing of cervical glands. ×750.

TABLE I. *Individual variations of E. koreana.*

Name and number of hosts	Body	Intestinal caeca	Testes	Ovary
Elaphe dione				
♯1.	2.05 mm. in length	asymmetrical	entire	posterior to acetabulum
♯2.	2.56 mm. in length	asymmetrical	slightly lobed	posterior to acetabulum
♯3.	2.99 mm. in length	symmetrical	entire	posterior to acetabulum
N. tigrina				
♯1.	3.56 mm. in length	symmetrical	lobed	slightly overlapped acetabulum
♯2.	4.08 mm. in length	asymmetrical	slightly lobed	left to acetabulum
♯3.	1.80 mm. in length	asymmetrical	slightly lobed	overlapped acetabulum
A. b. brevicaudus				
♯1.	6.70 mm. in length	asymmetrical	lobed	posterior to acetabulum
♯2.	5.73 mm. in length	symmetrical	lobed	posterior to acetabulum

Plagiorchiidae

Encyclometra natricis ~~gen. et sp. n.~~ Baylis and Cannon, 1924

The Trematode described in the following account was found in considerable numbers in two specimens of the grass-snake (*Tropidonotus natrix*) dissected in the Zoological Department, Imperial College of Science, in June 1923. Upon inquiry it was found that the snakes had been collected in Tuscany. The worms occurred mainly in the œsophagus, but a few were found in the stomach.

The species may be referred to the family Lepodermatidæ, Odhner, 1911, and appears to be very closely related to the type-genus, *Lepoderma*, Looss, 1899 (= *Plagiorchis*, Lühe, 1899), from which it differs chiefly in the disposition of the ascending and descending limbs of the uterus. In *Lepoderma* these both pass between the testes, whereas in the form here described they pass laterally to the testes. In this respect our form differs from the majority of the genera included in the family, but it would seem more reasonable to emend the family diagnosis, provisionally at least, to include it, than to exclude it rigidly on this ground. The difference in the arrangement of the uterus (which is seen in an incipient condition in *Opisthioglyphe*) is correlated with, and probably a consequence of, the median position of both testes. After considerable hesitation we have thought it advisable to make the species, of which a description follows, the type of a new genus.

Body flattened, oval, measuring 3·17–4·5 mm. in length and 1·1–1·75 mm. in width, and terminating in a small protuberance posteriorly. Cuticle unarmed. Oral sucker subterminal, 0·46–0·66 mm. in diameter. Ventral sucker at about the commencement of the middle third of the body, slightly larger than the oral sucker (diameter 0·49–0·78 mm.). Pre-pharynx short, extending just beyond the posterior margin of the oral sucker. Pharynx constricted anteriorly so as to appear pear-shaped, measuring 0·26–0·4 mm. in length and 0·22–0·3 mm. in width. Œsophagus absent, the gut bifurcating immediately behind the pharynx. Gut-branches reach to about the posterior eighth of the body. Genital pore a little in front of the anterior margin of the ventral sucker and considerably to the left of the median plane. Cirrus-sac extends transversely from the genital pore in front of the sucker, usually about as far as the middle line, where it curves posteriorly. It contains a pars prostatica and a large internal vesicula seminalis, which is constricted in the middle. Testes situated close together in the median plane, one behind the other, midway between the ventral sucker and the posterior end of the body, and measuring 0·3–0·4 mm. in diameter. Ovary situated at the level of the posterior margin of the ventral sucker, a little to the right of the median plane, and measuring 0·22 × 0·18 mm. to 0·3 × 0·2 mm. Laurer's canal present, much convoluted, opening approximately above the left posterior margin of the ventral sucker. Uterus extends with many convolutions to the posterior end of the body, passing round the testes and not between them. It passes down the right side of the body from the level of the ovary, occupies the space between the posterior testis and the hinder end of the body, and then runs up the left side to the genital pore. Its lateral loops do not extend beyond the gut-branches. Yolk-glands extend from the level of the posterior margin of the ventral sucker to the posterior end of the body. Their ducts cross the body immediately behind the ventral sucker. The follicles of the yolk-glands are mostly situated laterally to the gut-branches, but some of them extend inwards slightly on the ventral side. Excretory pore opens on the posterior protuberance. Excretory bladder Y-shaped, with short, rounded arms embracing the posterior border of the ventral sucker. Its main stem is very voluminous, occupying, in immature specimens, the whole space between the gut-branches and between the ventral sucker and the posterior end.

The form described above cannot, we believe, be identified with any of the thirty species of Trematoda recorded from snakes of the genus *Tropidonotus*, of which descriptions are accessible to us. It is certainly distinct from *Lepoderma* [*Plagiorchis*] *mentulatum* (Rud.), which occurs in *Tropidonotus natrix* and *T. tessellatus*, though bearing certain general resemblances to this form. The most obvious points in which it differs from it are (1) its much larger size; (2) the tandem arrangement of the testes, which in *L. mentulatum* are diagonally placed; (3) the extent of the yolk-glands, which here do not extend anteriorly beyond the ventral sucker, while in *L. mentulatum* they reach the level of the pharynx; and (4) the arrangement of the uterus already referred to.

Distomum allostomum, Diesing, 1850, which is recorded from *Tropidonotus natrix*, is so briefly described that its identification is probably impossible except by re-examination of the type-material, if such still exists.

Two forms, occurring in European snakes other than *Tropidonotus*, seem to approach rather closely to our species. *Distomum subflavum*, Stossich, 1892 *, from *Zamenis viridiflavus*, has the testes placed tandem and the yolk-glands, as in our form, extending from the ventral sucker to the posterior end. In other respects the description of *D. subflavum* is very incomplete. Its size, however (8 mm. in length and 2 mm. in width), is almost twice that of our largest specimens, and it seems improbable that the species are identical. *Distomum sauromates*, Poirier, 1886 † (which is referred to *Plagiorchis* by Stossich, and presumably is a *Lepoderma*), from *Coluber quatuorlineatus*, is of about the same size as our species, but its yolk-glands extend only from the anterior margin of the ventral sucker to the posterior testis, its genital pore is at the level of the pharynx, its testes are not tandem and the uterus passes between them.

(over)


1mm.

Encyclometra vitellata N. K. Gupta, 1954

Two specimens of *Natrix piscator* collected from Budha Nala, an arm of Sutlej river at Ludhiana, were examined for helminths. They were found to harbour many specimens of *Encyclometra vitellata*, n.sp. The worm (Fig. 1) is flat, elongated with round anterior end and gradually tapering posterior end. The body is smooth without any spines. The oral sucker is smaller than the ventral sucker. It is placed subterminally near the anterior end and measures 0·646–0·714 mm. in length and 0·680–0·765 mm. in breadth. Histologically, the oral sucker consists of interior circular, exterior circular and radial muscles. There are also 2-3 bands of circular muscles at the posterior end as an indication of posterior sphincter muscles. The ventral sucker measures 0·918–1·118 mm. in length and 0·935–1·156 mm. in breadth. It is composed of anterior external circular, anterior internal circular, posterior external circular and posterior internal circular muscles. There are also present in it exterior and interior longitudinal and radial muscles.

The prepharynx is quite distinct. The pharynx is also quite prominent and measures 0·323–0·425 mm. long and 0·340–0·493 mm. broad. Instead of interior circular muscles, it possesses interior longitudinal muscles. The oesophagus is very small and is surrounded by oesophageal gland cells. Intestinal caeca are lateral in position, terminating a little in front of the posterior end of the body. The right caecum is always smaller than the left. The intestinal bifurcation lies at a distance of 0·527–1·020 mm. in front of the ventral sucker.

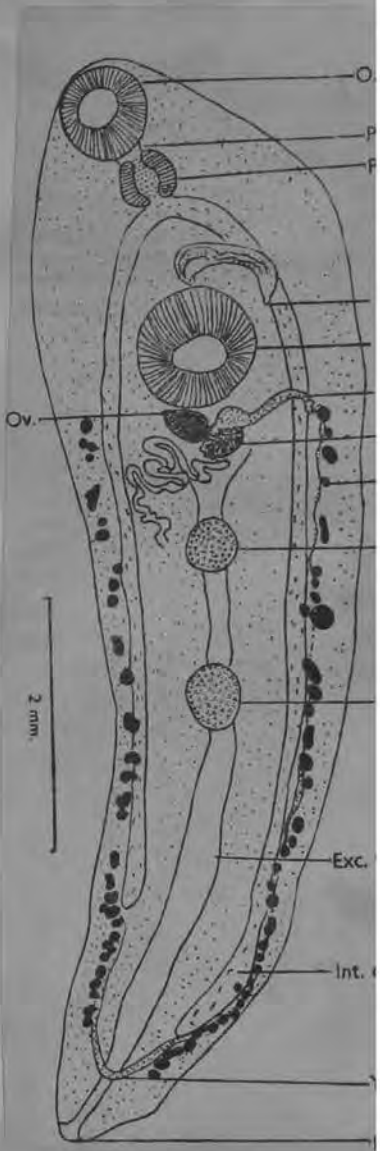
The testes are oval or subspherical, placed one behind the other in the median line behind the ventral sucker and much in front of the posterior end of the body. The anterior testis lies at about the middle of the body and measures 0·289–0·498 mm. in length and 0·255–0·476 mm. in breadth. The posterior testis is just behind the anterior testis but lies in the second half of the body. It is 0·340–0·544 mm. long and 0·340–0·476 mm. broad. The cirrus sac lies transversely in front and slightly to the left of the ventral sucker and measures 0·629–0·731 mm. in length and 0·221–0·238 mm. in breadth. The vesicula seminalis is a coiled structure and lies at the base of the cirrus sac. The pars prostatica is an enlongated tubular structure covered by the prostate gland cells. The ejaculatory duct is long and coiled before it opens at the genital pore which is situated to the left of the ventral sucker and just close to the left intestinal caecum.

The ovary is transversely or obliquely elongated and lies just behind the ventral sucker either in the median line or to the right of it. It measures 0·238–0·357 mm. in length and 0·255–0·391 mm. in breadth. The distance between the ovary and the anterior testis is almost equal to the distance between the latter and the posterior testis. The Mehlis' gland-complex lies close behind the ovary and to the left of it. The oviduct emerges from the left margin of the ovary and it is joined by the tubular receptaculum seminis and the duct of the yolk reservoir. The Laurer's canal is present.

The uterine coils are inter-caecal running along the inner sides of the intestinal caeca, leaving space in the middle where the excretory vesicle runs up to the posterior border of the ovary. The vitelline glands are extra-caecal, extending either from the level of the ovary or slightly behind it to a little in front of the posterior end of the body. The main vitelline ducts proceed anteriorly where they give off two transverse vitelline ducts which open into the yolk reservoir. An interesting feature noticed in this species is the union of two vitellaria by another transverse vitelline duct at the posterior end of the body.

The eggs measure 0·060–0·088 mm. in length and 0·028–0·040 mm. in maximum breadth.

The excretory vesicle is Y-shaped, the two lateral cornua are short.



Relationships

The new species *Encyclometra vitellata* differs from *E. caudata* (Polonio, 1859), *E. japonica* Yoshida and Ozaki (1929), *E. microrchis* Yamaguti (1933) and *E. asymmetrica* Wallace (1936) in having an additional transverse vitelline duct lying in the posterior region of the body.

FROM N. K. GUPTA, 1954

ENCYCLOMETRA

Enodiotrematinae Baer, 1924

Subfamily diagnosis. — Plagiorchiidae: Body subcylindrical, unspined. Oral sucker and pharynx small, esophagus short, ceca terminating some distance short of posterior extremity. Acetabulum very small, about one third of body length from anterior extremity. Testes diagonal, pre-equatorial. Cirrus pouch plump; seminal vesicle tubular, winding. Genital pore submedian, pre-acetabular. Ovary submedian, close to acetabulum. Receptaculum seminis present. Vitellaria follicular, extending along posttesticular portion of ceca. Uterus reaching to posterior extremity. Excretory vesicle Y-shaped(?). Parasites of turtles.

Enodiotrema Looss, 1900

Syn. *Enodia* Looss, 1899, preoccupied

Generic diagnosis. — Plagiorchiidae, Enodiotrematinae: Body subcylindrical, armed. Acetabulum very small, about one-third of body length from anterior extremity. Oral sucker and pharynx small, esophagus short, ceca terminating some distance short of posterior extremity. Testes diagonal, pre-equatorial. Cirrus pouch short and thick, pre-acetabular; vesicula seminalis tubular, winding; cirrus spined. Genital pore submedian, pre-acetabular. Ovary posterosinistral to acetabulum, with receptaculum seminis behind. Vitellaria consisting of large follicles, extending along posttesticular portion of ceca. Uterus intercecal, reaching to posterior extremity. Excretory vesicle Y-shaped, bifurcating between ovary and testes; arms terminating immediately behind intestinal bifurcation; stem and arms with numerous subdivided lateral branches. Intestinal parasites of turtles.

Genotype: *E. megachondrus* (Looss, 1899) Looss, 1901 (Pl. 44, Fig. 542), in *Chelone mydas, Thalassochelys corticata;* Egypt.

Other species:

E. instar Looss, 1901, in *Thalassochelys corticata;* Egypt.

E. reductum Looss, 1901, in *Thalassochelys corticata;* Egypt. Also in *Chelone mydas;* Panama.

Plagiorchiidae

Enodiotrema megachondrus (Looss, 1899) Looss, 1901

"After Looss" From Pra 1902

" From intestine of Thalassochl corticata and Chelone myd

From Looss, 1902.

Plagiorchiidae

Enodiotrema instar Looss, 1901

" EL. INTESTINE, THALASSOCHELYS CORTICATA "
From Looss, 1902

Plagiorchiidae

Enodiotrema reductum Looss, 1901

* FROM INTESTINE, THALASSOCHELYS CORTICATA"

From Looss, 1902.

M: Chelone mydas Panama
nec Caballero ~~1935~~ 1954 B 34-37

ENODIOTREMA

LOOSE LEAF INDEX

RABLE INDEX
VIDERS, SUITABLE
R SCHOOL OR
MMERCIAL USE.

IDEAL FOR CLASSIFYING, OR SEPARATING STUDIES, VARIOUS SUBJECTS OR MISCELLANEOUS DATA.

ne _____ Telephone _____

lress _____

ool _____ Class _____

irse _____ Year _____

SUBJECTS

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

CLASS SCHEDULE

PERIOD	FIRST	SECOND	THIRD	FOURTH	FIFTH	SIXTH	SEVENTH	EIGHTH
DAY COURSE								
INSTRUCTOR								
DAY COURSE								
INSTRUCTOR								
NESDAY COURSE								
INSTRUCTOR								
RSDAY COURSE								
INSTRUCTOR								
AY COURSE								
INSTRUCTOR								
RDAY COURSE								
INSTRUCTOR								

Glossidiella Travassos, 1927

Generic diagnosis. – Plagiorchiidae, Astiotrematinae: Body rather slender, but enlarged in forebody. Oral sucker somewhat larger than acetabulum, prepharynx large, pharynx longer than broad, esophagus practically absent. Ceca narrow, winding anteriorly, reaching to posterior extremity. Testes diagonal, in middle third of body. Cirrus pouch long, narrow, reaching backward to ovary, enclosing winding tubular seminal vesicle at its somewhat swollen base. Genital pore immediately anterolateral to acetabulum. Ovary submedian, a little behind acetabulum. Vitellaria extending along ceca from ovariotesticular level to near posterior extremity. Uterus overreaching ceca laterally, descending to posterior extremity. Excretory vesicle? Parasitic in lungs of snakes.

Genotype: *G. ornata* Travassos, 1927 (Pl. 49, Fig. 594), in *Eunectes murinus, Cyclagras gigas;* Brazil.

GLOSSIDIELLA

Glossidioides ~~n.g.~~ Yamaguti, 1958

Generic diagnosis. — Plagiorchiidae, Styphlodorinae: Body fusiform. Acetabulum small, in anterior third of body. Oral sucker followed by very wide prepharynx, esophagus practically absent. Ceca terminating some distance short of posterior extremity. Testes diagonal, close together in middle third of body. Cirrus pouch lying transversely between acetabulum and intestinal bifurcation. Genital pore anterolateral to acetabulum. Ovary posterolateral to acetabulum. Uterine coils overreaching ceca laterally, not reaching to posterior extremity. Vitellaria extending along each side of body between level of ovary and cecal ends. Excretory vesicle -shaped. Parasitic in lungs of snakes.

Genotype: *G. loossi* (Travassos, 1927) n.comb., syn. *Glossidium l. T.* (Pl. 45, Fig. 553), in *Eunectes murinus, Cyclagras gigas;* Brazil.

GLOSSIDIOIDES

Glossimetra Mehra, 1937

Generic diagnosis. Plagiorchiidae, Astiotrematinae. Body elongate, spined. Oral sucker subterminal, small. Pharynx small. Esophagus short, bifurcating some distance anterior to acetabulum, terminating near posterior extremity. Acetabulum larger than oral sucker, in anterior third of body. Testes oblique, postequatorial. Cirrus pouch large, elongate, largely postacetabular, containing coiled tubular seminal vesicle, long narrow pars prostatica and wide spined cirrus. Genital pore median, immediately pre-acetabular. Ovary submedian, in midregion of body. Receptaculum seminis absent. Laurer's canal present. Uterus passing between two testes and reaching to posterior extremity; eggs small. Vitellaria occupying lateral fields of greater part of hindbody. Excretory vesicle Y-shaped, with long stem and long arms reaching oral sucker. Parasitic in freshwater tortoises.

Genotype: *G. orientalis* Mehra, 1937 (Pl. 50, Fig. 610), in intestine of *Kachuga dhongoka*; India.

Gupta (A.N.) and Sharma (1973) suggest that Allopharynx Stroma, [sic] 1928, and Microderma Mehra, 1931, are subgenera of Glossimetra Mehra, 1937. [reprint in file]

No! Taxonomic considerations aside, this violates Law of Priority.

***Emended diagnosis of Glossimetra* MEHRA, 1937:**

Plagiorchidae, Astiotrematinae. Body elongate spined. Oral sucker subterminal, small. Pharynx small. Oesophagus of considerable length, bifurcating some distance anterior to acetabulum, terminating near posterior extremity. Acetabulum larger than oral sucker, in anterior third of body. Testes oblique, transversely elongated, with a tendency to be post equatorial. Cirrus pouch large, elongate, largely postacetabular, extending upto ovarian level, containing coiled tubular seminal vesicle, long narrow pars prostatica and wide spined cirrus. Genital pore median, immediately preacetabular. Ovary submedian, in mid region of body. Receptaculum seminis absent. Metraterm present. Laurer's canal present. Uterus passing between two testes and reaching to posterior extremity, eggs small. Vitellaria occupying lateral fields of greater part of hind body. Excretory vesicle Y shaped, with long stem and long arms reaching oral sucker. Parasitic in freshwater tortoises.

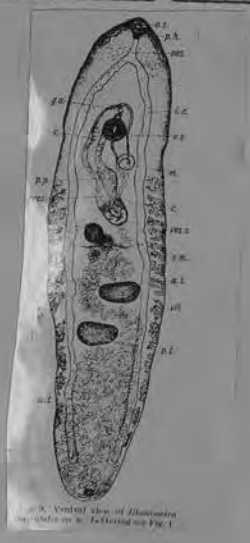
SHARMA AND GUPTA (1971)

Plagiorchidae

Glossimetra Mehra, 1937

Body elongated and somewhat elliptical, of moderate length. Oral sucker smaller than ventral sucker; ratio in their size 3:4. Prepharynx and pharynx present; oesophagus of moderate length; intestinal bifurcation much in front of ventral sucker; intestinal caeca reaching near hinder end. Genital opening median, immediately in front of ventral sucker. Testes entire, elliptical or transversely oval, post-equatorial, nearly equal, obliquely situated. Cirrus sac large, elongated with its long axis parallel to the body length, thin walled with slightly developed musculature, more or less curved in an S-shaped manner or rarely much curved and crescent-shaped, extending far behind ventral sucker to middle or posterior margin of ovary. Vesicula seminalis coiled in small basal part of cirrus sac; pars prostatica long, narrow; cirrus muscular with a wide lumen, armed with minute chitinous scales; prostate gland cells numerous, surrounding pars prostatica and terminal part of vesicula seminalis. Ovary entire, dextral, pretesticular, nearly rounded; receptaculum seminis absent; Laurer's canal present. Uterus voluminous, passing between testes, coiled characteristically, filling hinder body; metraterm large, without folds in its walls. Vitellaria lateral from about half way between ventral sucker and ovary or from a little behind middle of cirrus sac to a little distance in front of hinder end. Excretory pore subterminal, dorsal; excretory bladder Y-shaped with a long stem bifurcating into long cornua reaching oral sucker. Ova oval, thin walled, yellow brown, 0.024--0.03 x 0.009--0.012 in size. Parasitic in fresh water tortoise.

Type species: Glossimetra orientalis



STATUS OF THE GENUS *GLOSSIMETRA* MEHRA, 1937 (FAMILY-PLAGIORCHIDAE (LÜHE, 1901) WARD, 1917) IN STYPHLOTREMATINAE BAER, 1924, ASTIOTREMATINAE BAER, 1924 AND STYPHLODORINAE DOLLFUS, 1937 COMPLEX

ABSTRACT : YAMAGUTI and SKRJABIN differ vitally regarding the assignment of *Glossimetra* MEHRA, 1937 along with other common and uncommon genera under the subfamilies Astiotrematinae BAER, 1924; Styphlotrematinae BAER, 1924 and Styphlodorinae DOLLFUS, 1937. Recognition of Astiotrematinae by YAMAGUTI and not by SKRJABIN, recognition of Styphlotrematinae by SKRJABIN and not by YAMAGUTI on one hand and recognition of Styphodorinae by both lends complication in the taxonomy. Exclusion of *Neomicroderma* PARK, 1940 and *Parallopharynx* CABALLERO, 1946 from Astiotrematinae along with a suggestion that Astiotrematinae, Styphlodorinae and Plagiorchinae of the family Plagiorchidae LÜHE 1901 do not differ much in their diagnostic characters.

This is the second paper of the current series on this genus. The first being "Review of the genus *Glossimetra* MEHRA, 1937 and proposed synonymy of *G. narmadi* DWIVEDI, 1967 and *G. tamiensis* DWIVEDI, 1967 with *G. orientalis* MEHRA, 1937" (1970). In the third paper an attempt has been made to discuss the validity of different genera assigned under these subfamilies.

The genus *Glossimetra* was erected by MEHRA(1937). YAMAGUTI in his monumental memoir Systema Helminthum (1958) includes this genus in Astiotrematinae BAER, 1924. He along with *Glossimetra* includes the following genera, these being, *Astiotrema* LOOSS, 1900; *Allopharynx* STROMA, 1928; *Glossidiella* TRAVASSOS, 1927; *Microderma* MEHRA, 1931; *Neomicroderma* PARK, 1940; *Parallopharynx* CABALLERO, 1946 and *Spinometra* MEHRA, 1931. However, SKRJABIN instead of agreeing with YAMAGUTI in assigning the genus *Glossimetra* in Astiotrematinae differs in recognizing the validity of this subfamily. He rather assigns it under a separate subfamily Styphlotrematinae BAER,1924 of family Plagiorchidae recognized by SKRJABIN and others (1964) (see Key to trematodes of Animals and Man, Translated by R. W. DOOLY) not recognized by YAMAGUTI (1958). SKRJABIN includes *Glossimetra* MEHRA, 1937 along with genera *Pachypsolus* LOOSS, 1901; *Styphlotrema* ODHNER, 1911; *Styphlodora* LOOSS 1899; *Glossidium* LOOSS, 1899. Thus SKRJABIN includes the three genera of Astiotrematinae recognized by YAMAGUTI only under this subfamily-viz., *Glossimetra*, *Spinometra* and *Glossidiella*. Naturally, this poses a question whether Astiotrematinae BAER, 1924 and Styphlotrematinae BAER, 1924 are synonyms though either of the two authors recognized only one of the two. Since both these subfamilies were created by BAER in 1924 they must have been done on distinction from one another. The differences between the two subfamilies mainly are in the shape of the seminal vesicle and pars prostatica. Neither SKRJABIN nor YAMAGUTI ever mentioned that one is synonymous to the other. The inclusion of uncommon genera in the list of the genera included under these two subfamilies, makes it further complicated. This reflects whether these uncommon genera are valid and recognized by both of them, if so reasons for these being assigned under separate subfamilies. YAMAGUTI recognizes all these four genera viz., *Pachypsolus* LOOSS, 1901; *Styphlotrema* ODHNER, 1911; *Styphlodora* LOOSS, 1899 and *Glossidium* LOOSS, 1899. But he assigns all except *Pachypsolus* under another subfamily Styphlodorinae DOLLFUS, 1937 belonging to the family Plagiorchidae. *Pachypsolus* is assigned under a new family Pachypsolidae YAMAGUTI, 1958. This family is not recognized by SKRJABIN who has made the problem all the more complicated by including *Glossidiella* TRAVASSOS, 1927 in two distinct subfamilies viz., Styphlotrematinae BAER, 1924 and Styphlodorinae DOLLFUS, 1937. SKRJABIN keeps the genus *Allopharynx* in Styphlodorinae while the two genera assigned by YAMAGUTI under Astiotrematinae viz., *Parallopharynx* CABALLERO, 1940 and *Neomicroderma* PARK, 1940 are not recognized by SKRJABIN. SKRJABIN further complicates the issue by assigning the genus *Astiotrema* under two subfamilies namely Lepodermatinae LOOSS, 1899 and Plagiorchinae PRATT, 1902. The assignment of the same genus under two distinct and recognized subfamilies belonging to Plagiorchidae naturally takes ones to a fix. Lopodermatinae LOOSS, 1899, however, is not recognized by YAMAGUTI.

The genus *Microderma* MEHRA, 1931 assigned by YAMAGUTI under Astiotrematinae is instead kept by SKRJABIN under Lepodermatinae LOOSS, 1899 and Plagiorchinae PRATT, 1902. The subfamily Lepodermatinae apart from *Astiotrema* includes *Haplometra* LOOSS, 1899; *Haplometrana* LUCKER, 1931; *Microderma* MEHRA, 1931; *Lepoderma* LOOSS, 1899; *Neolepoderma* PARK, 1940 and *Glypthelmins* STAFF., 1905 according to SKRJBIN. Here again comes the same question – inclusion of the same genera under two distinct subfamilies belonging to Plagiorchidae LÜHE,1902. Besides

(over)

Astiotrema [illegible] *Microderma* the genera *Haplometra*, [illegible]*metrana* and *Glyptheminis* are also inclu[illegible]wo separate subfamilies Lepoderma[illegible]ooss, 1899 and Plagiorchinae PRATT

[illegible]e status of [illegible]enus *Glossimetra* is further highlighted because of its another placing when one looks into the different genera assigned under the subfamily Styphlodorinae DOLLFUS, 193[illegible]. SKRJABIN assigns the genus *Glossimetra* MEHRA, 1937 in this subfamily also and along with it are included *Spinometra*, *Allopharynx* and *Glossidiella* too. So except for *Astiotrema* all other genera included under Astiotrematinae by YAMAGUTI figure under this subfamily Styphlodorinae according to SKRJABIN who does not recognize *Parallopharynx* and *Neomicroderma*. Thus only *Microderma* is not included under Styphlodorinae by SKRJABIN. This instead has got its placement under two subfamilies viz., Lepodermatinae LOOSS, 1899 and Plagiorchinae PRATT, 1902 as discussed earlier.

It appears there could be a little bit unanimity of opinion between the taxonomic position of these genera if the two subfamilies viz., Astiotrematinae and Styphlodorinae could be synonymized. But SKRJABIN recognizes Styphlodorinae and not Astiotrematinae while YAMAGUTI recognizes both as distinct. The practical difficulty about the placement of the same genera under two distinct subfamilies by SKRJABIN remains inexplicable. A comparison of the genera included by SKRJABIN under sub families Styplotrematinae and Styphlodorinae reflects this aspect. Except *Glossidioids* YAMAGUTI, 1958 and *Allopharynx* STROMA, 1928 which are kept in Styphlodorinae and *Pachypsolus* LOOSS, 1901 and *Styphlotrema* ODHNER, 1911 which are included in Styphlotrematinae. There are common genera included under the two subfamilies viz., Styphlotrematinae and Styphlodorinae. A detailed study of the above mentioned genera and the species included them might help solve this tangle and in that case both may be attempted to be declared synonymous. A next step would then be to compare Styphlodorinae of SKRJABIN concept and Astiotrematinae of YAMAGUTI concept and because of near closeness in the inclusion of most of the similar genera by the two wizzards of trematode taxonomy, attempts would be made to overhaul and then suppress Astiotrematinae and uphold Styphlodorinae. But this venture faces one more hurdle as YAMAGUTI also recognize Styphlodorinae. In YAMAGUTI's concept of Styphlodorinae only such genera viz., *Styphlodora*; *Glossidioides* and *Glossidium* which are also included in Styphlodorinae of SKRJABIN concept are common among the list containing 14 genera which have been included by YAMAGUTI in subfamily Styphlodorinae.

The present authors are, however, also of the view that inclusion of the genera *Neomicroderma* and *Parallopharynx* by YAMAGUTI under the subfamily Astiotrematinae is not justified in view of the tandem position of their testes apart from few other characters for example postequatorial position of the ovary in case of *Parallopharynx*.

On looking into the three subfamilies of the family Plagiorchidae namely Astiotrematinae, Styphlodorinae and Plagiorchinae, it is clear that there are not much points significant enough on which the distinctive characters of the three subfamilies could be maintained. When these three subfamilies viz., Astiotrematinae, Styphlodorinae and Plagiorchinae are compared from points of view of their diagnostic characters appears that except in the location of ventral sucker, testes and ovary from the anterior end, the three subfamilies appear very similar in their diagnostic characters. The dissimilarities appear either superficial, artificially created or not worth of a subfamily rank. All the three resemble in shape of body, spinose or unspinose characters of their body wall, in having oesophagus, generally small. Oral sucker small or moderately developed, caeca extending to posterior end mostly. Testes mostly oblique to diagonal vitelline follicles extending laterally in hind body. Whatever little difference do these have can hardly form characters of subfamily distinction.

The characters of ventral sucker regarding its location from the anterior end, position of genital opening in relation to ventral sucker; position of testes from anterior end, position of ovary from ventral sucker are characters of phylogenetic significance. The present authors, however, feel that there are clear indications for the disposition of testes to be oblique, diagonol [illegible]en symmetrical being situated in posterior half of middle third of body, m[illegible] region or posterior half of body or post[illegible]rior half of body or posterior half to midd[illegible] third of body. The testes being separate[illegible] by uterine coils.

Further there is a tendency for cirrus s[illegible] to be elongated and then extend as far [illegible] beyond ventral sucker or to be neare[illegible] ovary.

The ovary progressively shows a te[illegible]dency to move away from the anterio[illegible] testis and come to be nearer ventral sucker[illegible] In Astiotrematinae, the ovary is widely separated from ventral sucker and anterior testis. In Styphlodorinae it is nearer ven[illegible]tral sucker and anterior testis while i[illegible] Plagiorchinae it is posterior or posterolat[illegible]eral to acetabulum.

Similarly the position of the genita[illegible] opening shows a drift from the preace[illegible]tabular position to a position anterior t[illegible] acetabulum then to be immediately pre[illegible] acetabular as one passes from Astiotrema[illegible]tinae to Styphlodorinae and Plagiorchina[illegible]

From Gupta and Sharma, 1973

Glossimetra orientalis Mehra, 1937

(Fig. 24)

The following description is based upon a single specimen recovered from the intestine of one out of 20 specimens of *Kachuga smithi* from Sulemanki Headworks (river Satlej).

24

The body of the worm is elongate with maximum width at its third quarter and with broadly pointed extremities. The anterior one third of the body is beset with backwardly directed spines. The subterminal oral sucker is situated at the anterior extremity and is followed by a very short prepharynx. The ventral sucker is placed at about one third of the length of the worm from the anterior extremity at a distance of 1.818 mm. It is slightly larger than the oral sucker. The pharynx is subspherical and smaller than the oral sucker. The oesophagus is long. The intestinal fork lies at a distance of 0.818 mm from the anterior extremity and 0.969 mm in front of the ventral sucker. The intestinal caeca terminate in front of the posterior extremity.

The testes are situated in the middle of the post-acetabular region of the body. They are placed slightly obliquely one behind the other with a narrow intertesticular area. They are transversely oval in outline. The anterior testis is slightly smaller than the posterior one and is situated at a distance of 0.264 mm behind the ovary. The posterior testis lies at a distance of 1.515 mm from the posterior extremity. The cirrus sac is well-developed and much elongated extending from the anterior margin of the ovary to the anterior margin of the ventral sucker. It encloses a very much coiled vesicula seminalis, a ductus ejaculatorius, pars prostatica and a well-developed unarmed cirrus. The genital atrium, measuring 0.098 × 0.117 mm lies anterolateral to the ventral sucker. The ovary is pretesticular, lying at a distance of 1.090 mm behind the ventral sucker in the intercaecal space and is almost spherical and slightly submedian. The vitellaria are in the form of small rounded follicles, arranged in 10-11 groups on each side in the extracaecal fields. Anteriorly they extend to the mid-level of the cirrus sac and posteriorly they terminate at the middle of the post-testicular region. The closely coiled uterus occupies most of the post-testicular intercaecal field and then passes between the two testes. The metraterm is well-developed and thick-walled. The eggs are small, numerous, light yellow in colour, operculate and unembryonated. The excretory vesicle is Y-shaped.

Measurements

(All measurements in millimetres)

Body length	5.999
Body width	0.939
Oral sucker	0.196 × 0.225
Ventral sucker	0.254 × 0.254
Pharynx	0.117 × 0.137
Oesophagus	0.470
Ovary	0.245 × 0.284
Anterior testis	0.343 × 0.460
Posterior testis	0.362 × 0.490
Cirrus sac	1.515
Eggs	0.012—0.020 × 0.012

Host: *Kachuga smithi*
Location: Intestine
Locality: Sulemanki Headworks (river Satlej)

Discussion

The present specimen resembles *G. orientalis* Mehra, 1937, in all essential features and has been identified as such. However, it has been reported for the first time from Pakistan.

From BHUTTA AND KHAN, 1975

Glossimetra narmadi Dwivedi, 1967

supp. of G. orientalis Mehra, 1937 [see Sharma and Gupta (1971)]

Glossimetra tamiansis Dwivedi, 1967

syn. of G. orientalis Mehra, 1937 [see Sharma and Gupta (1971)]

GLOSSIMETRA